May 6, 1946

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STEEL

The Magazine of Metalworking and Metalproducing

ESTABLISHED 1882

TECHNOLOGY DEPT.

EDITORIAL CONTENTS, PAGE 99

MOLTRUP

symbolism of PRECISION PERFECTION

COLD DRAWN STEEL
TURNED AND POLISHED STEEL
MACHINE KEYS • MACHINE RACK

FLATTENED GROUND AND
POLISHED STEEL PLATE

FOUNDRY PLATES
(PATTERN, CORE AND BOTTOM)

MOLTRUP STEEL PRODUCTS CO.

BEAVER FALLS, PENNSYLVANIA

AP v. 118 3 May-June 1946

NEW PIERCER OUTLET TABLE

ROTATING BAR AND TUBE GUIDES

Operating men have been talking for years about an outlet table using only one set of guide rolls to do two jobs. They prodded engineers into developing the idea and here it is.

As pierced tube approaches mandrel guide — guides automatically open up in sequence to serve as tube guides.

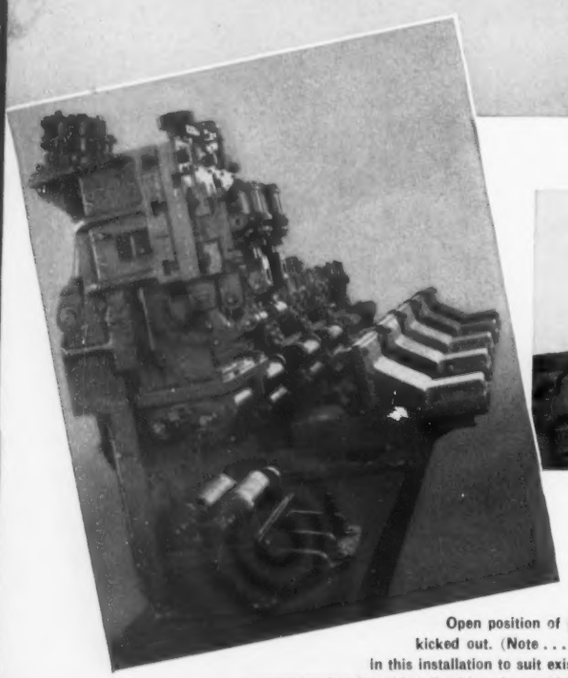
A size change is easy as 1-2-3. One man, without crane service or extra man power, makes a size change in a few minutes. He simply adjusts by calibrated indicator.

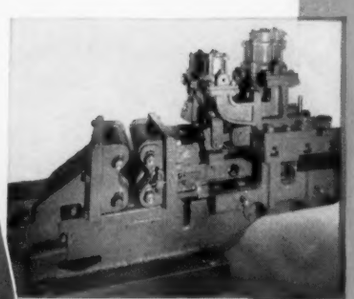
Full length support from thrust block to piercer point eliminates play or whip and cuts down on wear and tear of equipment. All this results in better concentricity, more uniform wall, and improved outside finish . . . a better product.

Ask for complete information. Designed by Aetna-Standard, world's foremost builder of seamless tube and continuous buttweld pipe mills.

THE AETNA-STANDARD ENGINEERING CO.
YOUNGSTOWN, OHIO

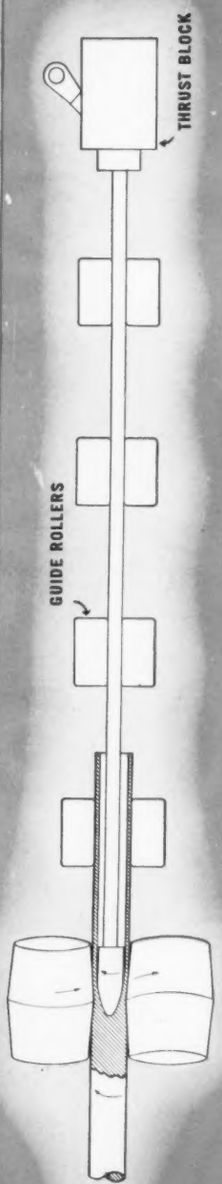
ASSOCIATED COMPANY
HEAD, WRIGHTSON & COMPANY, LIMITED, THORNABY-ON-TEES, ENGLAND





Closed position for guiding mandrel bar.

Open position of guide units ready for tube to be kicked out. (Note . . . first vertical guide unit required in this installation to suit existing piercing mill clearances. On conventional outlet table, all guide units would be horizontal type.)



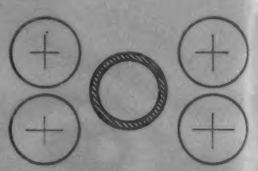
FEATURES OF NEW PIERCER OUTLET TABL

One set of rollers covers range from 2⅜ mandrel bar up to 9⅝" O.D. tube.

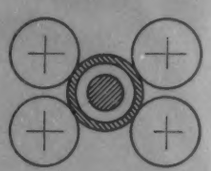
No extra guides necessary for extra sizes.

Size change set up by one man without cran service.

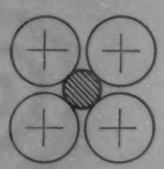
Mandrel bar supported entire length fro thrust block to piercer point.



ROLLERS IN OUT-POSITION FOR TUBE TO BE KICKED OUT



ROLLERS IN TUBE GUIDING POSITION

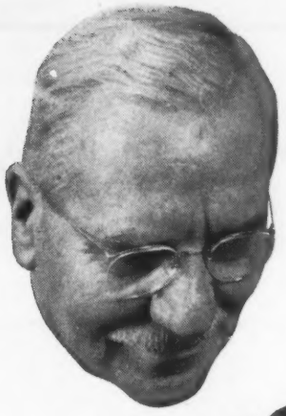


ROLLERS IN BAR GUIDING POSITION

DESIGNERS and BUILDERS to the Steel, Non-Ferrous and Chemical Industries.

Aetna-Standard

TECHNOLOGY DEPT.



"I'M SURE GLAD WE USED BETHANIZED"

"ME TOO! THE COATING CAN REALLY TAKE IT!"

Wire fabricators have a real friend in bethanized wire. For here is a zinc-coated wire that comes through even a severe forming operation with the coating undamaged.

Bethanized wire is excellent for tough forming jobs because its zinc coating is so ductile and so tightly bonded to the steel base. Locked to the base wire by an advanced electrolytic process, the bethanized coating is 99.9 per cent pure, ductile zinc. In fact the coating is so ductile that bethanized wire can be bent . . . twisted . . . wrapped around its own diameter—even drawn to fine gage—without the coating being damaged in any way.

In addition to its tightness and ductility the bethanized coating is uniform. It's so uniform—so evenly distributed, that it hasn't a thin spot anywhere, either around or along the wire.

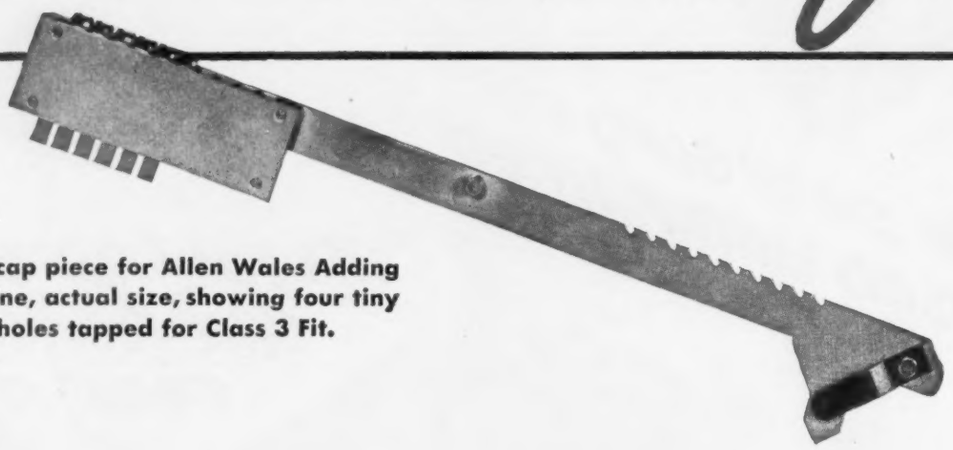
Its remarkable uniformity together with its purity give bethanized wire another decided advantage—stubborn resistance to corrosion. And where corrosive conditions are unusually severe bethanized wire can be supplied with a coating weight up to three times as heavy as those specified in conventional Type 3 galvanizing.

Perhaps you're now manufacturing a range of products in which bethanized wire could be used to advantage. If so, just say the word, and we'll be glad to send detailed information to your desk.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

★ Bethanized Wire ★ BETHLEHEM STEEL ★

Proven Cure for



Type cap piece for Allen Wales Adding Machine, actual size, showing four tiny holes tapped for Class 3 Fit.

The Allen Wales Adding Machine Corporation, Ithaca, New York, is one of the world's outstanding manufacturers of adding machines. One small part in the adding machine's precision mechanism calls for four small holes to be tapped for No. 1-72 pitch threads to Class 3 fits. This tapping was being done with a tapping head rigged on a drill press.

Tap breakage, in spite of operators' skill and care was serious — averaged about 20 broken taps each week — a steady monetary loss in ruined taps, plus slowed-up output, to raise production costs.

The job was transferred to a Warner & Swasey No. 10 Precision Tapping machine, newly acquired, with the result that:

PRODUCTION INCREASED FROM 175 TO 300 PIECES PER HOUR

with tap breakage now averaging less than 2 taps per week.

OPERATORS' RATE INCREASED

Increased production and lower tap charges justified operators' rate readjustment—a decidedly happy experience for management and operator alike.

In scores of plants the installation of Warner & Swasey Precision Tapping and Threading machines shows results which mean that the investment has quickly paid for itself and is operating at a clear profit.

A Warner & Swasey field man can check your tapping jobs and predict accurately what *you* can expect from these new machines.

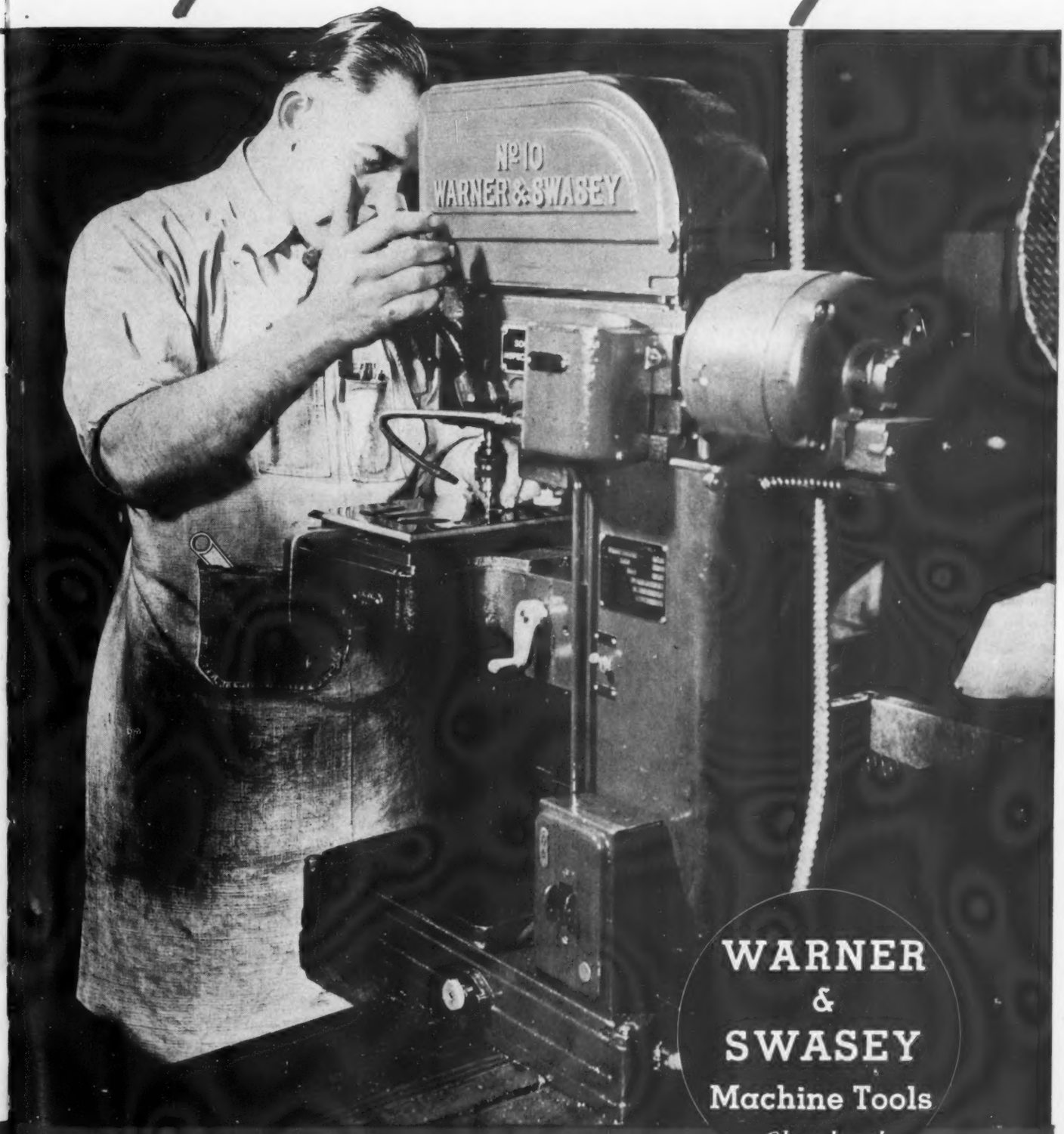
WRITE FOR BULLETIN

describing mechanical features of the Warner & Swasey Precision Tapping and Threading Machine best suited to fit your needs.

No. 10 (Bench Model)—Capacity, No. 0-80 to 10-24
No. 11 — Capacity, No. 8-36 to 7/8"
No. 11R-Radial — Capacity, No. 8-36 to 7/8"
No. 12 — Capacity, 3/8" to 2½"

TURRET LATHES, MULTIPLE SPINDLE AUTOMATICS, PRECISION TAPPING AND THREADING MACHINES

Tap Breakage



WARNER & SWASEY
Machine Tools
Cleveland

YOU CAN MACHINE IT BETTER, FASTER, FOR LESS... WITH A WARNER & SWASEY

BEHIND THE SCENES

with Shrdlu

The Foundrymen Are Here

This week we have with us the foundry show. To put it more properly, we had better give it the dignity of capital letters and a full title, thus: The 50th Anniversary Golden Jubilee Convention and Exposition of the American Foundrymen's Association. That's a big name, but it's a big show. We'll be on tap, hanging around with our sister publication, *The Foundry* and getting another case of convention feet. This is the third and last of the big metal industry shows to be held this spring in the Cleveland Public Auditorium and its catacombs. After this, we get a rest until the Iron & Steel Engineers move in on us next fall. Of course we should mention again in passing that the Mid-American exposition, on the occasion of Cleveland's sesquicentennial celebration, will fill the big hall later this month and a lot of our good neighbors from the Foundry, Metal and Tool shows will be exhibiting at that time.

Index Is Available

We know that a lot of you readers keep back files of STEEL for reference, and another lot of you write in to ask us if we have published such-and-such by so-and-so in the recent past. To help locate material on any given subject, we have recently completed a new index which lists all major articles of 1945 under their main subjects. It is called "STEEL's Topical Index", and if you have occasion to use a bibliography of this sort, we'll be glad to send you one for free.

Reprints Can Be Had

Our reprint department advises that they now have available copies of their newest opus, "Modern Zinc Electroplating Practice", by Dr. Allen Gray, who also is the newest addition to our masthead, as consulting editor on things about metal finishing. Dr. Gray has some other tricks up his sleeve, according to the ninth floor gossip mill, which will provide interesting dope for you and you. The present work on zinc is available at one half-buck per copy from Shrdlu or any other convenient member of our staff, discounts allowed for quantities over 10 copies per order. Also from the rep. dep. we learn that soon we will be able to offer copies of "Lubrication in the Deep Drawing of Metals", that popular series by Saml. Spring. This job will cost you a buck, and well worth it, too, if you're plagued with wrinkles in your stampings. We are also informed by the rep. dep. that copies of the Hauck report, "Steel Expansion for War", are available at 2 bucks per copy. This book is now complete with the addition of a supplement, and shows all the new steelmaking facilities built during the war, replete with pictures. Runs more than 200 pages with the supplement, and we'll be quite happy to sell you a copy, or more.

It's Modern in Brazil, Too

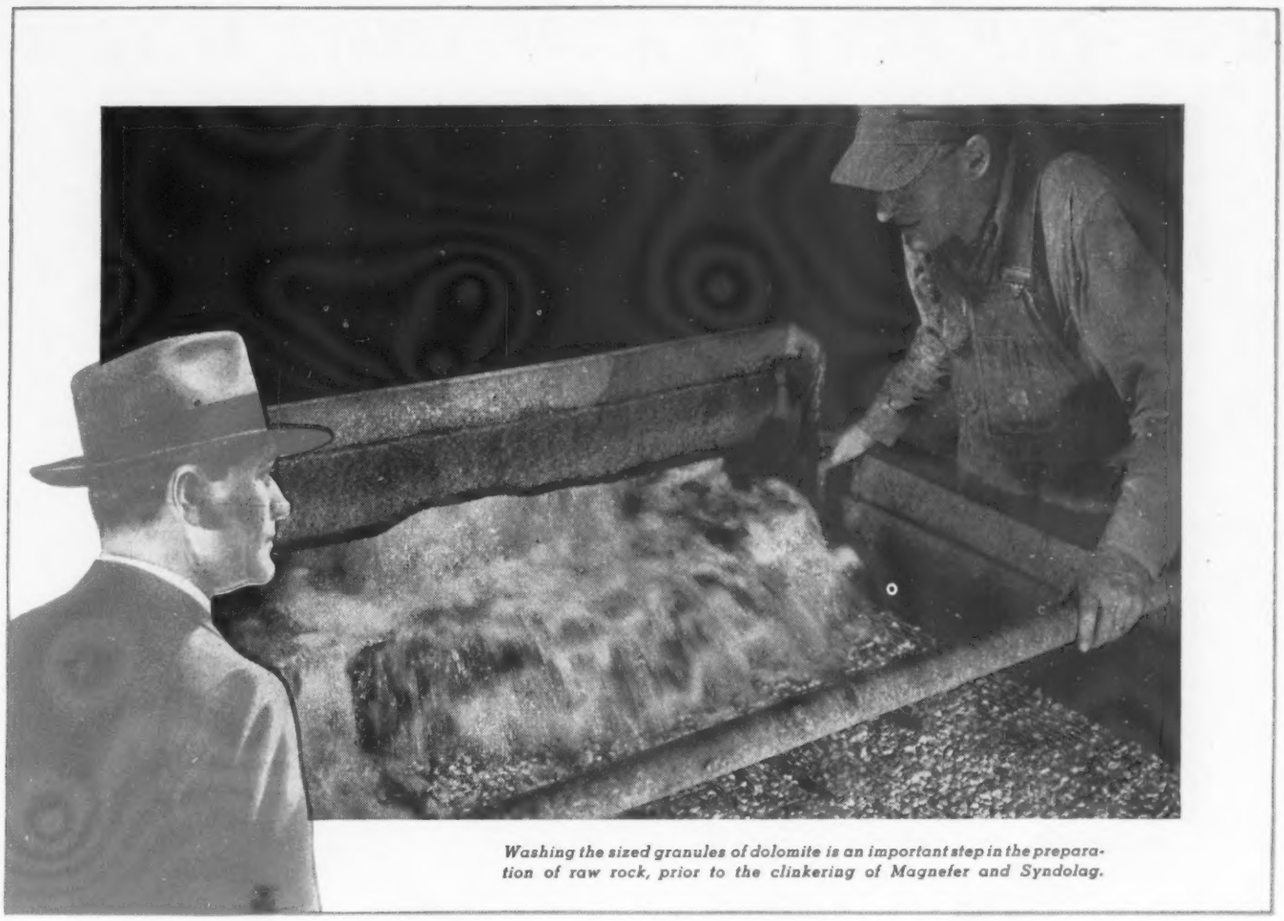
We are credited this week with an assist to the metallurgical industry of Brazil, our large and friendly neighbor to the south. Seems that some copies of our current reprint, "Modern Heat Treating Practice", were forwarded to the "Ee-pay-tay" (which is American treatment of IPT, the initials of Instituto de Pesquisas Technologicas) and this outfit, which is the government-sponsored center of research and school of engineering, asked for permission to translate the booklet into Portuguese. Permission has been granted, and we hope the Brazilians find it as popular as we have among people interested in heat treating.

Top O' The List

We have just completed a tabulation of the articles summarized by the government during 1945 from some 200 business papers. These articles are chosen as important contributions to America's technological progress, and during 1945 some 793 articles were summarized. Out of this total, 74 articles came from STEEL—far more than any other business paper. This makes the third straight year that STEEL has led the list—which is our cue to reach up and pat the collective back of our 27 full time editors and 10 correspondents and contributors whose effort to gather and present all that's new in the metalworking industry have been thus recognized. Good work, it is—and we can assure you that they're keeping it up. For example, this week's book has an important new article on gas turbines, a new method of electroplating on aluminum, and a top-notch article on steel maintenance, to name just three of the dozens of features.

Vol. 118, No. 19, May 6, 1946, issue of STEEL, published every Monday at Cleveland, Ohio. Entered as second class matter at the post office, Cleveland, O., under act of March 3, 1879. U. S. and possessions, Canada, Mexico, Cuba, Central and South America, 1 year $6; 2 years $10; all other countries, 1 year $12. Current issues, 25c. Yearbook of Industry issue, $2.00.

(Editorial Contents—page 99)



Washing the sized granules of dolomite is an important step in the preparation of raw rock, prior to the clinkering of Magnefer and Syndolag.

CLEAN REFRACTORY•• CLEAN BOTTOM •• CLEAN STEEL

ONE reason so many furnace operators prefer Magnefer and Syndolag is because they are uniform in quality—in chemical make-up, as well as in sizing. They are "clean" refractories. This makes it easier to maintain a clean bottom with Magnefer or Syndolag, and that, in turn, results in cleaner steel.

Three important things contribute to the clean, high quality of Magnefer and Syndolag. First, the dolomite from which they are made is better than 99% pure. Second, the clay overburden is carefully and thoroughly stripped from the dolomite ledge before rock is quarried. Third, the prepared, sized dolomite is washed before burning, to remove any possible remaining impurities. Then, in the clinkering process, suitable bonding agents are introduced to give those characteristics which furnace operators recognize as ideal in a fettling refractory.

The Basic Sales Engineer who calls on you may be able to give you suggestions for using Magnefer or Syndolag most economically, and to improve your fettling practice. He is a practical steel man. His intimate knowledge of refractories, backed by actual experience in making steel, may enable him to help reduce your refractory cost per ton of steel. Don't hesitate to think of him as *Your* Refractory Engineer.

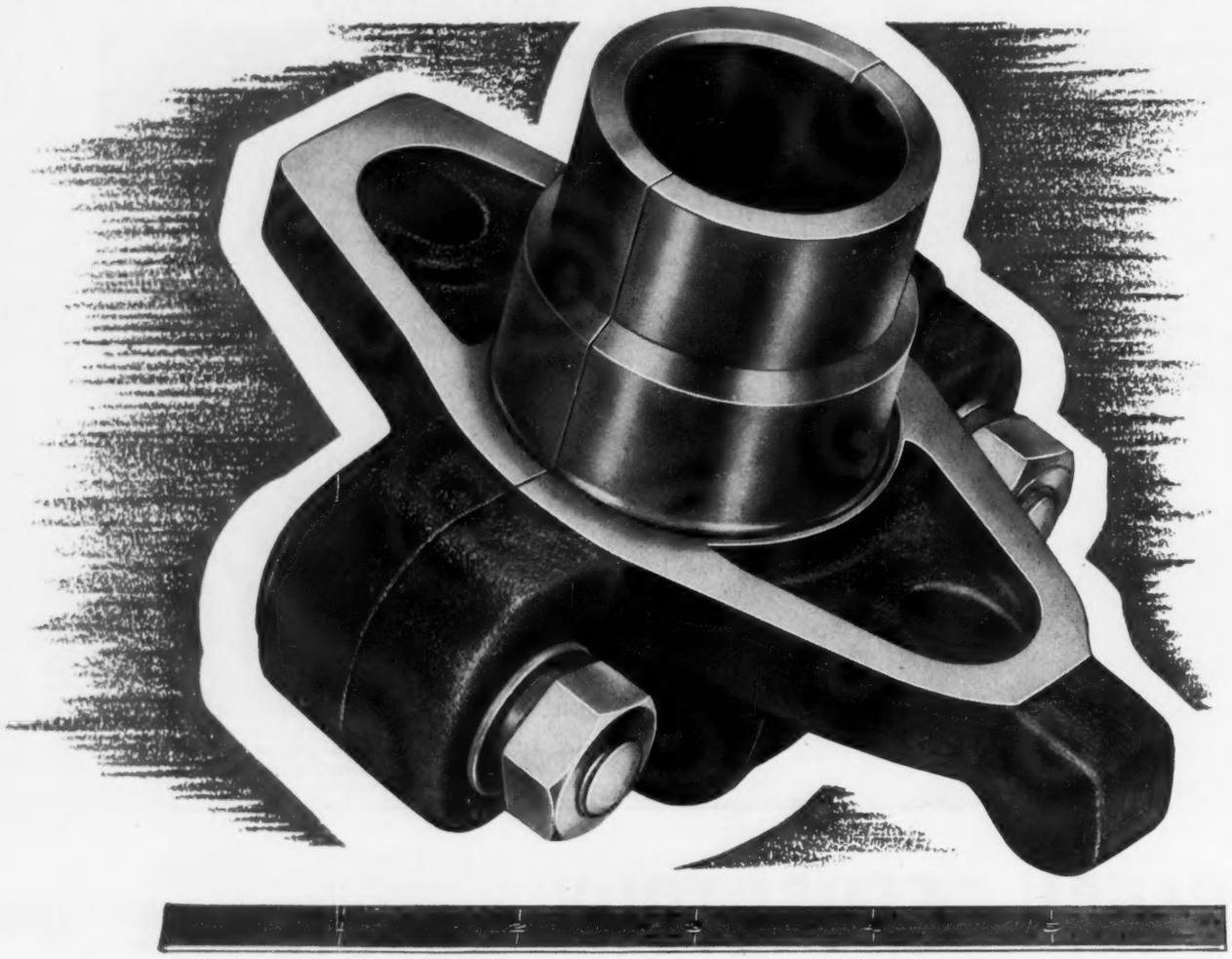
BASIC FURNACE REFRACTORIES

BASIC REFRACTORIES, INCORPORATED

845 HANNA BUILDING
Cleveland 15, Ohio

Exclusive Agents in Canada: **REFRACTORIES ENGINEERING AND SUPPLIES, LTD., Hamilton and Montreal**

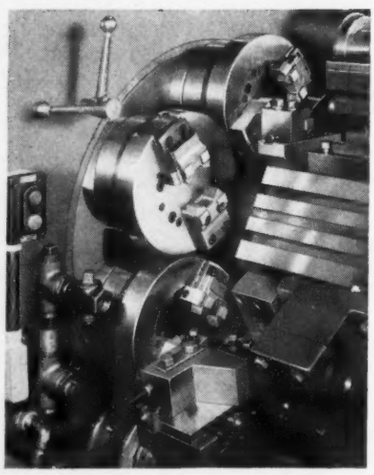
LEADERSHIP BASED ON ACCOMPLISHED FACTS...

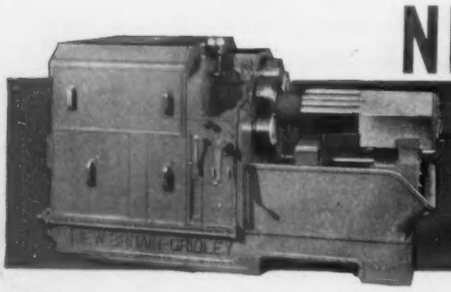


A case of machining a complete sub-assembly

Illustrated above is a malleable iron hub used in textile machinery. The two halves bolted together as shown are loaded exactly like a single piece, and our Model 16 Six Spindle Automatic Chucking Machine performs the facing, turning, chamfering and undercutting operations with a substantial saving of time and cost.

This interesting job may well suggest important possibilities in connection with your products . . . Our engineers will gladly put their time and experience at your disposal to help you discover profit-making advancement in any machining application. Consult the New Britain sales engineer in your locality or write The New Britain Machine Company.

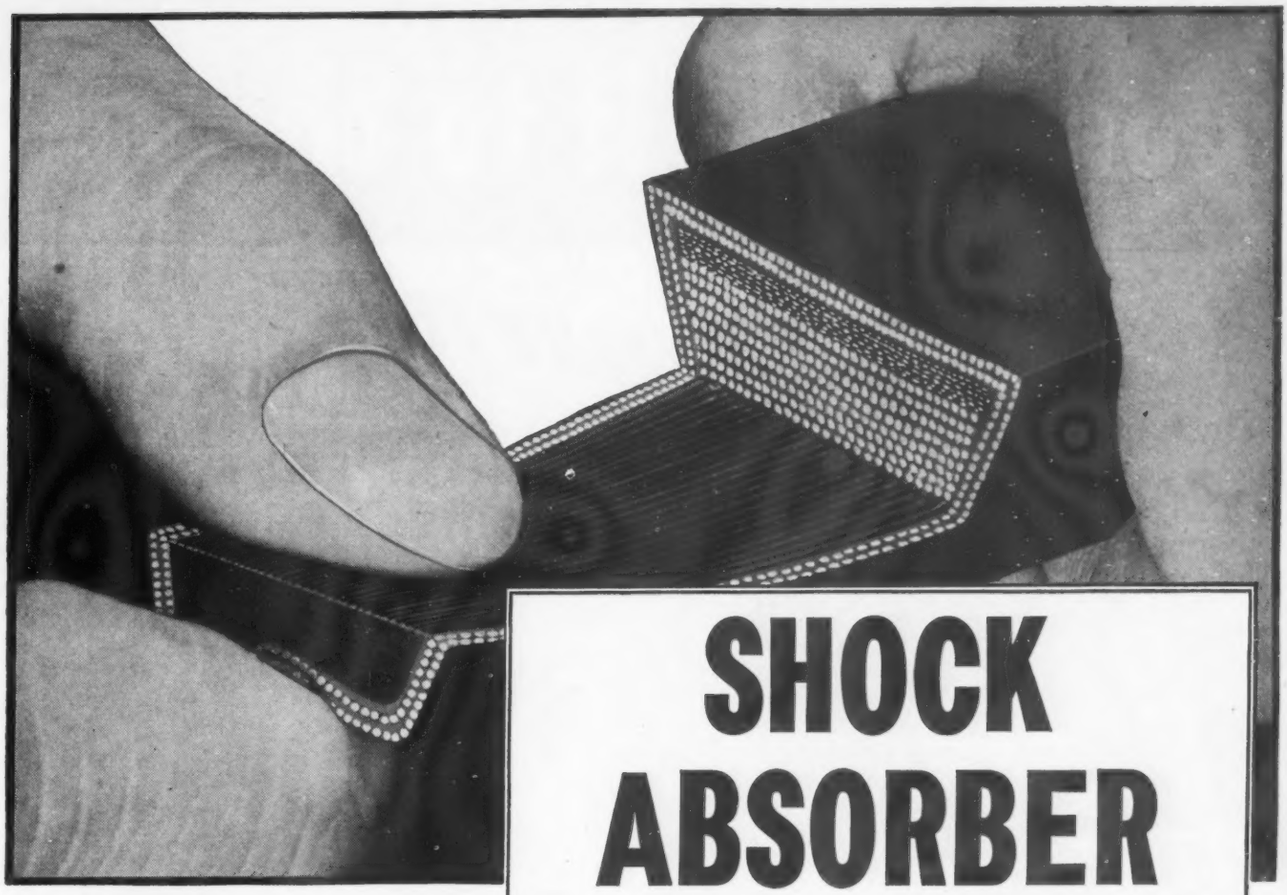




NEW BRITAIN AUTOMATICS

THE NEW BRITAIN MACHINE COMPANY
NEW BRITAIN, CONNECTICUT
NEW BRITAIN-GRIDLEY MACHINE DIVISION

M-01035



SHOCK ABSORBER

To Make TEXROPE V-Belts Run Longer

Under the load-pulling cord section of every TEXROPE V-Belt lies a thick, springy cushion of cool-running Buna-S. This cushion acts as a shock absorber to protect the cords from stresses that might weaken them. This carefully proportioned cushion is one of the reasons why TEXROPE "Super-7" V-Belts are known by all industry for their long life and smooth, efficient power transmision. Other reasons are: *More Cords, Stronger Cords,* hard-twisted of selected long staple cotton — *Tough Duplex Cover* to resist wear and keep out dirt — *War-Proved Buna-S* — an improved, cooler-running rubber compound developed for TEXROPE Super-7 V-Belts.

YOUR V-BELT DRIVE HEADQUARTERS

Call your Allis-Chalmers office or dealer for TEXROPE Super-7 V-Belts — for full range of standard, "Magic-grip" and Vari-Pitch sheaves — for Speed Changers and complete V-Belt Drive engineering help. ALLIS-CHALMERS, MILWAUKEE 1, WISCONSIN.

HEAR THE BOSTON "POPS": *Every Saturday Evening, American Broadcasting Co.*

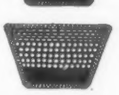
A 2033

5 TEXROPE Super-7 Belts ...Select the one you need

Heat-Resisting Super-7
Stands temperatures up to 180°. The TEXROPE V-Belt for most drives.

Oil-Resisting Super-7
Neoprene cover protects core against moderately oily or greasy conditions.

Oil-Proof Super-7
Made of Neoprene throughout. Use it when the belt must swim in oil.



Static-Resisting Super-7
Recommended where explosion hazard exists. Static-conducting element throughout cover won't wear off.

Super-7 Steel
Twin steel cables, to pull extremely heavy loads with minimum stretch.

GET THEM — through your Allis-Chalmers district office or dealer.

TEXROPE Super-7 V-Belts result from the co-operative research of two great companies—Allis-Chalmers and B. F. Goodrich—and are sold exclusively by A-C.

ALLIS AC CHALMERS
TEXROPE V-BELT DRIVES

Don't leave it to chance

WITH A CARNIVAL WHEEL of 15 numbers, the odds against your winning the coffee pot, kewpie, or cash, are, naturally, 14 to 1. And these 14 to 1 odds are against you at every turn, regardless of how many times your number may have previously failed to win.

LEAVE IT TO— HY-TEST

THE SAFETY SHOE WITH THE ANCHOR FLANGE STEEL BOX TOE

This flange adds extra strength to the steel arch's sidewall. Anchored between insole and outsole, it also serves to resist shifting and tilting when toe is struck at an angle.

Bucking the odds at 14 to 1 is far less foolhardy than working on hazardous jobs without the protection of safety shoes. And when workers look for best protection they want the safety shoe with the Anchor-Flange Steel Box Toe—HY-TEST.

Workers never see or feel the Anchor-Flange Steel Toe, but when something drops on the foot, this built-in fortress is johnny-on-the-spot shielding toes from foot-crippling accidents that cost both workers and plant a lot of money. Built on roomy lasts and sturdily constructed for longer wear, Hy-Test Safety Shoes have a winning way with workers. That's why more wear them. And the Hy-Test in-plant servicing plan makes it easy for all to have this Hy-Test protection. Write for details.

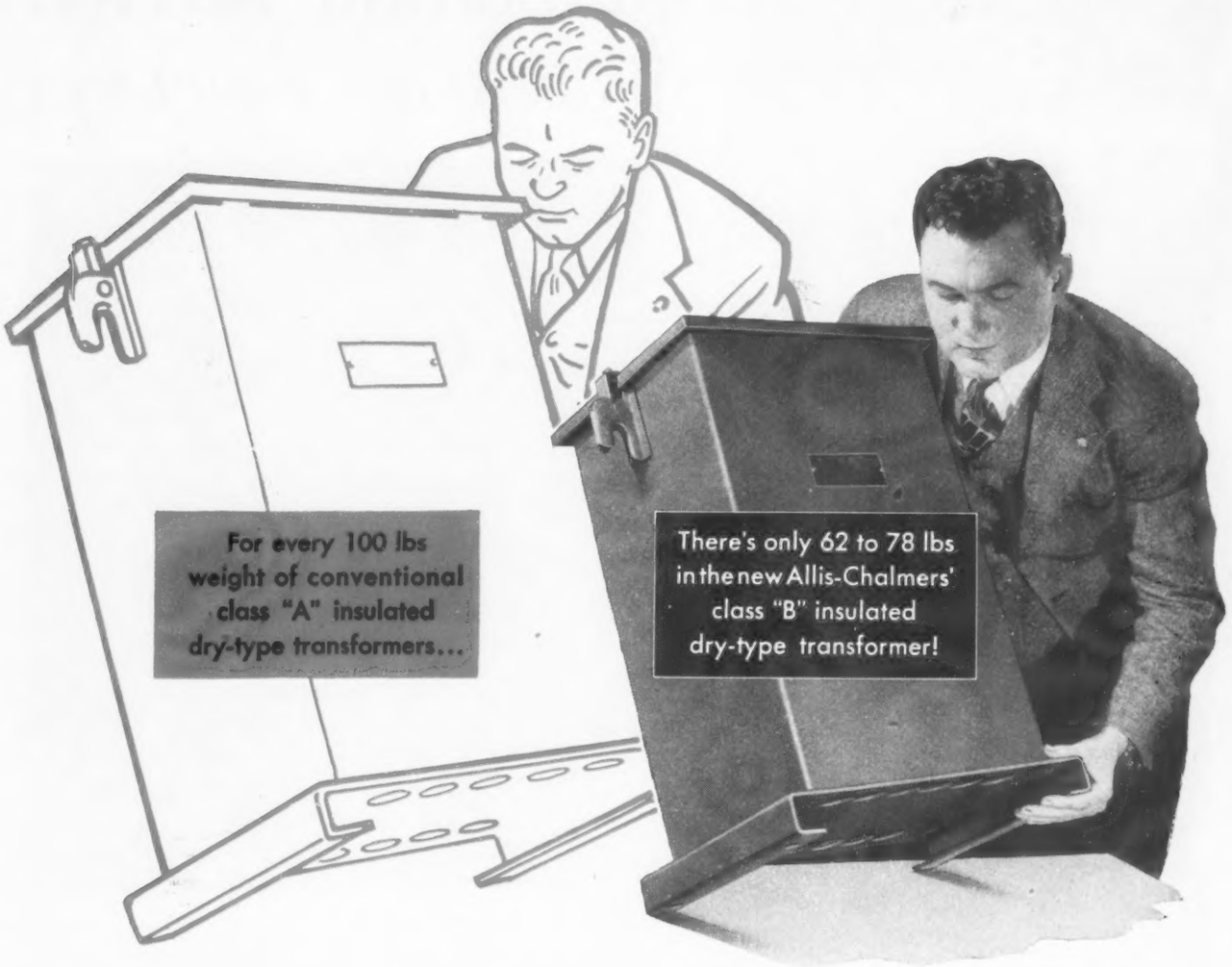
THE WORLD'S LARGEST SELLING SAFETY SHOE

HY-TEST *Safety Shoes*

HY-TEST DIVISION • INTERNATIONAL SHOE COMPANY • ST. LOUIS 3, MO.
EASTERN OFFICE • MANCHESTER, N. H.

Save 22 to 38% Weight

WITH ALLIS-CHALMERS NEW DRY-TYPE TRANSFORMERS!


For every 100 lbs weight of conventional class "A" insulated dry-type transformers...
There's only 62 to 78 lbs in the new Allis-Chalmers' class "B" insulated dry-type transformer!

THIS REDUCED WEIGHT HELPS YOU TWO WAYS:

☛ It means wider range of installation . . . you can put these handy units almost anywhere you need secondary power — even on or next to machines!

☛ It cuts down installation cost . . . you use less mounting materials—save runs of heavy secondary copper by placing these lighter units closer to load centers.

For complete details, get in touch with your nearest Allis-Chalmers dealer or sales office, or send for new descriptive bulletin B6382.

CLASS "B" INSULATION MEANS OTHER ADVANTAGES, TOO...

Saves Space — reduces overall dimensions as much as 1/3 compared with class "A" insulated types.

Safer Installation — no combustible materials, no insulating liquids . . . thus, no fireproof vaults needed!

Longer-Life — resists higher temperature and protects against moisture.

Savings — 14 sizes ranging from 1½ to 300 kva, *cost no more* than class "A" insulated units. A 2015

HEAR THE BOSTON "POPS": *Every Saturday Evening, American Broadcasting Co.*

ALLIS AC CHALMERS DRY-TYPE TRANSFORMERS

IT PAYS TO GET EXPERIENCED ENGINEERING ADVICE *ON SEALING PROBLEMS*

"Perfect" Single Element Seal

"Perfect" Dual Element Seal

A transmission manufacturer in the design of an improved postwar power take-off, had selected a "Perfect" Dual Type Seal. He was willing to pay the price for this type unit in order to assure the maximum in sealing efficiency.

Chicago Rawhide Seal Engineers, after studying the drawings, recommended a minor change in the bearing housing and adjacent elements for the use of the less expensive, conventional single element "Perfect" Oil Seal.

When put on test, the desired improvement in performance had been achieved and at a reduced cost.

Chicago Rawhide Seal Engineers devote *all* their time to sealing problems. Their vast experience has aided many designers to achieve maximum sealing efficiency at minimum cost. Ask for their suggestions on your sealing problems.

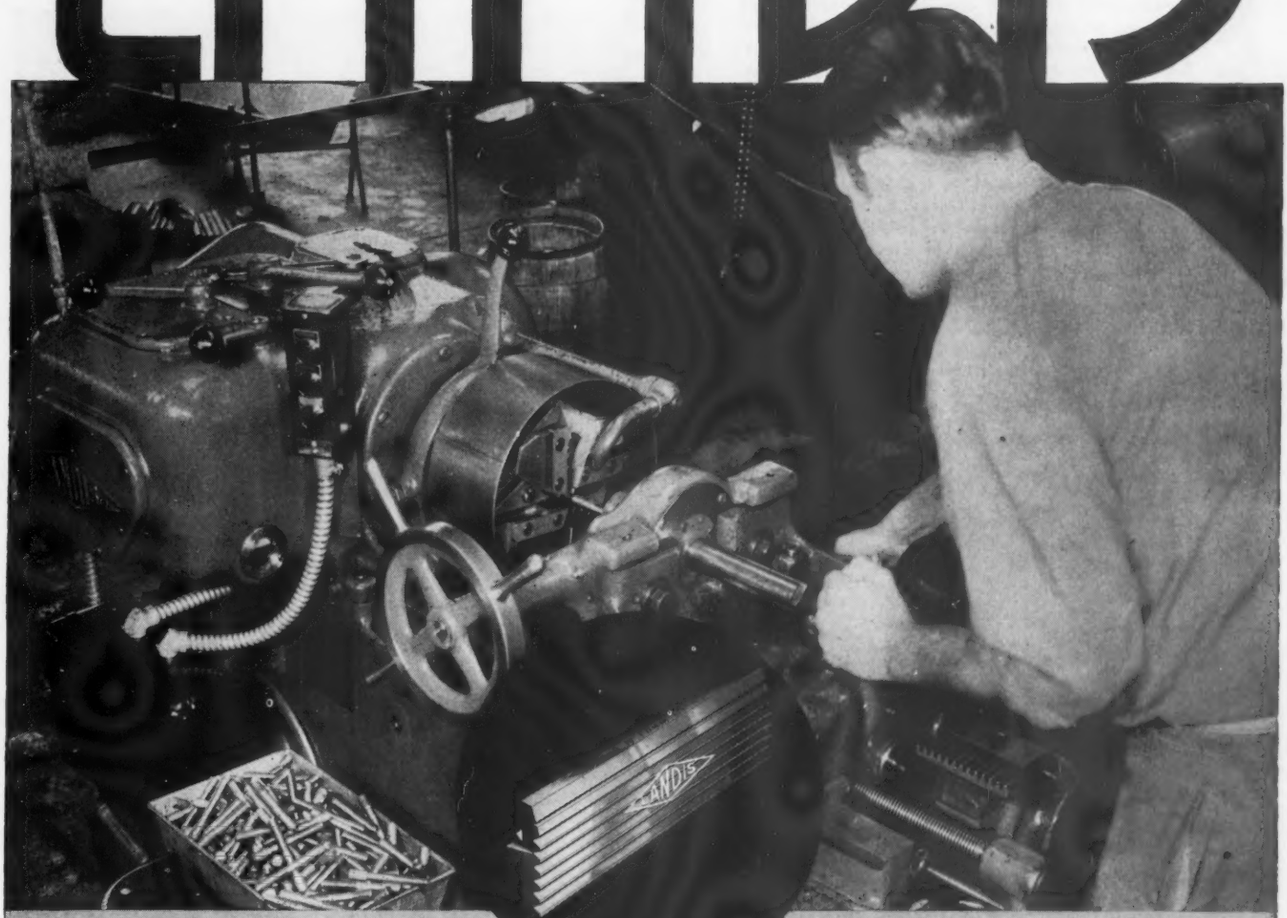
CHICAGO RAWHIDE MANUFACTURING CO.

1308 ELSTON AVENUE • CHICAGO, ILLINOIS

Philadelphia • Cleveland • New York • Detroit
Boston • Pittsburgh • Cincinnati

66 Years Manufacturing Quality Mechanical Leather Goods Exclusively and now Sirvene Synthetic Products

LANDIS



THREADING MACHINERY

THREAD CUTTING DIE HEADS

COLLAPSIBLE TAPS

Greater Accuracy Higher Production at Lower Cost....
Write for Catalog

LANDIS MACHINE COMPANY

WAYNESBORO, PENNSYLVANIA, U.S.A.

Capacity . . .

MARVEL 18 *for Size,* MARVEL 6A and 9A *for Volume Production*

With this battery of twelve No. 6A and No. 9A MARVEL High Speed Automatic Hack Saws, the Hammond & Irving Forge Co. of Auburn, New York can cut-off billets automatically, not only in tremendous numbers, but in accurate weights and sizes to exactly fill each die without waste. With 12 of the "world's fastest cutting-off saws", they were able to keep all hammers running on their tremendous war orders, and were able to instantly resume peacetime manufacturing without re-tooling or other delay. The No. 6A and No. 9A MARVEL automatics have capacities of 6" x 6" and 10" x 10" respectively.

In addition to the battery of MARVEL Automatics, Hammond & Irving have cutting-off *capacity* of a different sort in their MARVEL No. 18 Hydraulic Hack Saw—capacity for size because their stroke giant will cut-off the largest billets and bars. It easily handles the toughest steels in sizes to 18" x 18" cross section.

ARMSTRONG-BLUM MFG. CO.

"The Hack Saw People"

5700 Bloomingdale Ave., Chicago 39, U.S.A.

Eastern Sales Office: 225 Lafayette St., New York 12, N. Y.

HIGH STRENGTH

N-A-X HIGH-TENSILE STEEL
HAS ALL SIX—KEEPS ALL SIX

- HIGH STRENGTH
- EASY FORMABILITY
- EXCELLENT WELDABILITY
- HIGH FATIGUE-RESISTANCE
- GREAT IMPACT TOUGHNESS
- HIGH CORROSION-RESISTANCE

GREAT STEEL FROM GREAT LAKES

FOR LIGHTER WEIGHT . . . LONGER LIFE IN TRANSPORTATION EQUIPMENT

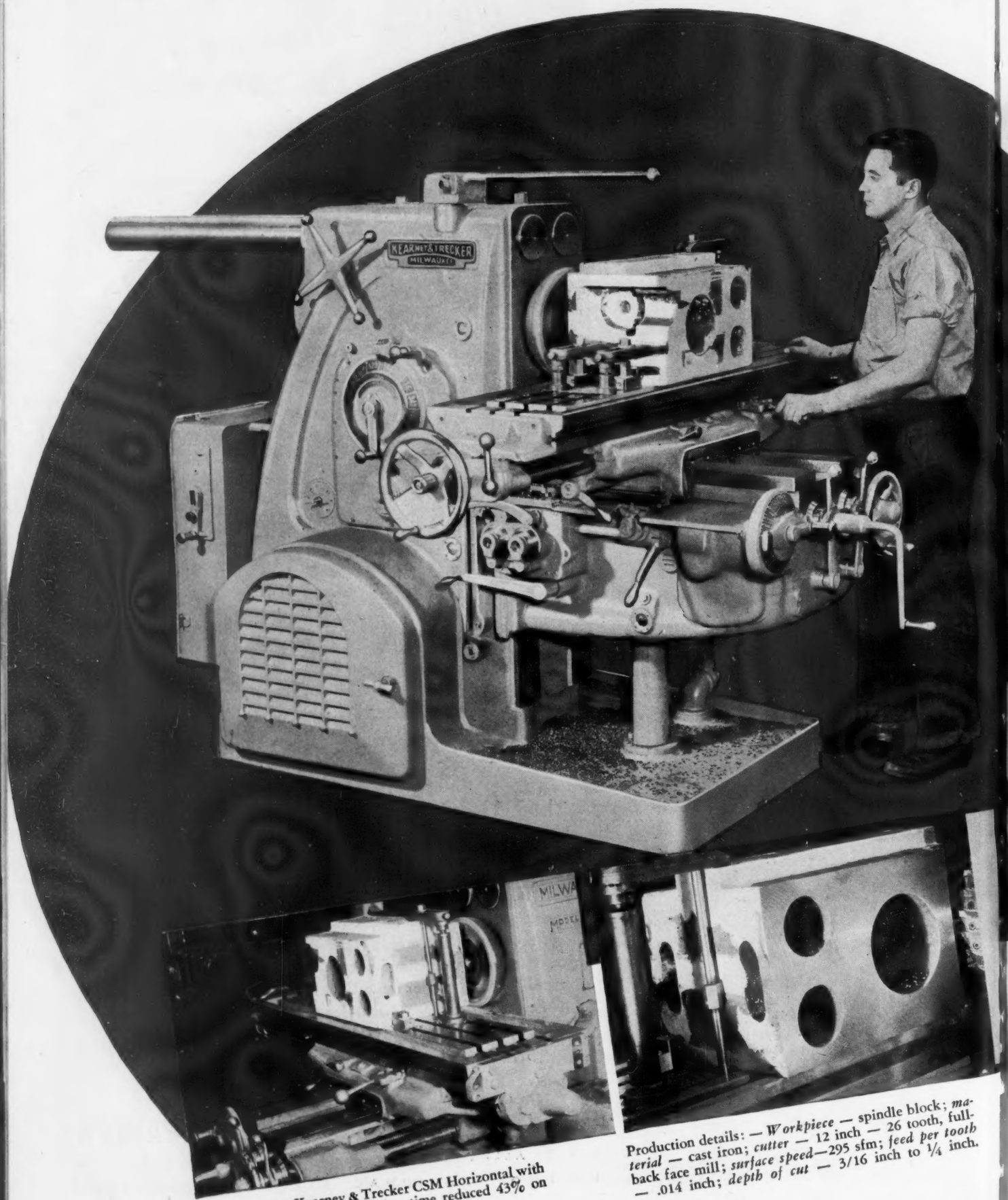
Combining great inherent strength with exceptional formability, N-A-X HIGH-TENSILE steel has wide application in the design of improved transportation equipment. Where reduced weight means increased efficiency, its high physical properties may be utilized to permit thinner sections; if greater durability is the important consideration, identical sections can be made stronger and tougher with N-A-X HIGH-TENSILE steel.

Consistent with the trend toward lighter, more efficient designs, N-A-X HIGH-TENSILE benefits the field of transportation by eliminating deadweight in favor of greater payloads.

GREAT LAKES STEEL CORPORATION

N-A-X ALLOY DIVISION • DETROIT 18, MICHIGAN
UNIT OF NATIONAL STEEL CORPORATION

The Most Powerful Milling



Using a 30 hp Kearney & Trecker CSM Horizontal with carbide cutters, total production time reduced 43% on this face milling operation.

Production details: — *Workpiece* — spindle block; *material* — cast iron; *cutter* — 12 inch — 26 tooth, full-back face mill; *surface speed*—295 sfm; *feed per tooth* — .014 inch; *depth of cut* — 3/16 inch to 1/4 inch.

Machines of Their Type!

20-30-50 hp

Kearney & Trecker CSM's

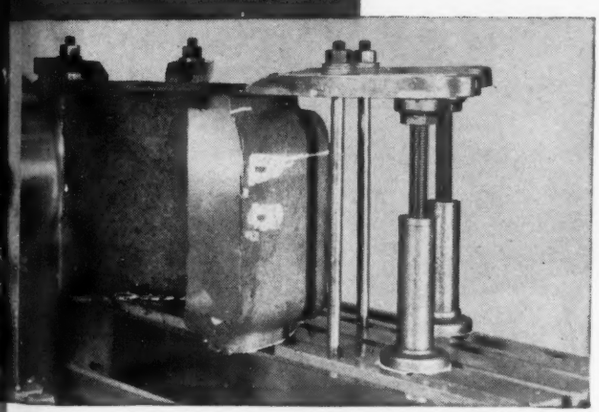
★ You get new high rates of metal removal—ferrous and non-ferrous — without sacrifice of precision.

★ —you get closer tolerances—finer finishes—precision performance — through smooth flow of power to the cutter.

★ —expressly designed for carbide milling of steel but adapted to all-purpose milling, as well.

★ —broad range of application — wide range of speeds and feeds.

★ —exceptional ease of operation — centralized conveniently located controls.



Machine Time Reduced 87%:—surface finishes improved when this operation was performed on a 20 hp CSM Horizontal using carbide milling cutters! *Workpiece* — bearing shell; *material* — cast steel; *cutter* — 10 inch, 12 tooth CSM face mill; *surface speed* — 460 sfm; *feed per tooth* — .010 inch; *depth of cut* — 3/16 inch to 1/4 inch.

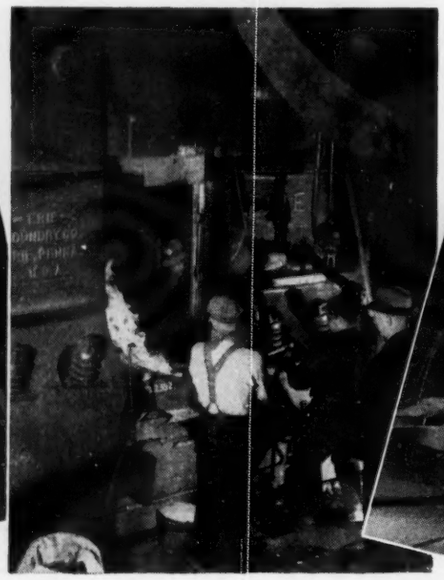
Engineered—from the ground up—for every milling need of today and tomorrow — investigate Kearney & Trecker CSM's; write for Catalog No. CSM-20.

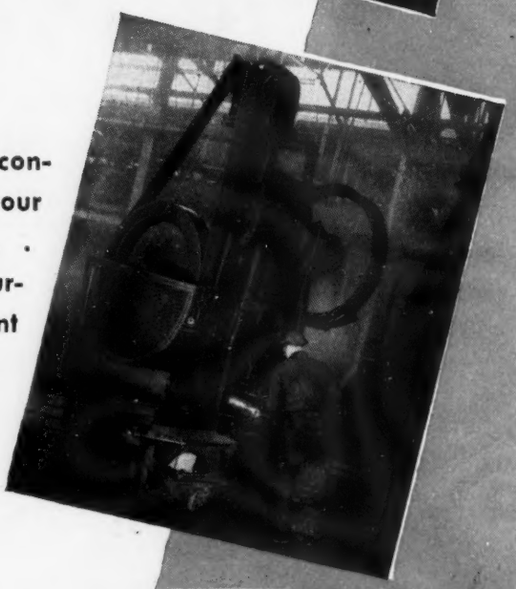
Kearney & Trecker
CORPORATION
MILWAUKEE 14 WISCONSIN

"Be Ready for Tomorrow — with CSM's!"

"DIVERSITY"

ERIE builds the right hammer for the job . . . Here illustrated *in operation* are Erie Steam, Air and Board Drop Hammers, Erie Single and Double Frame Forging Hammers, and Erie Trimming Presses . . . products of a half century of hammer design and building "know how".





Erie engineers will consult with you on your requirements . . . write us before purchasing equipment for producing modern forgings.

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Bulletins giving full details on any or all of these Erie products are available to you for the asking.

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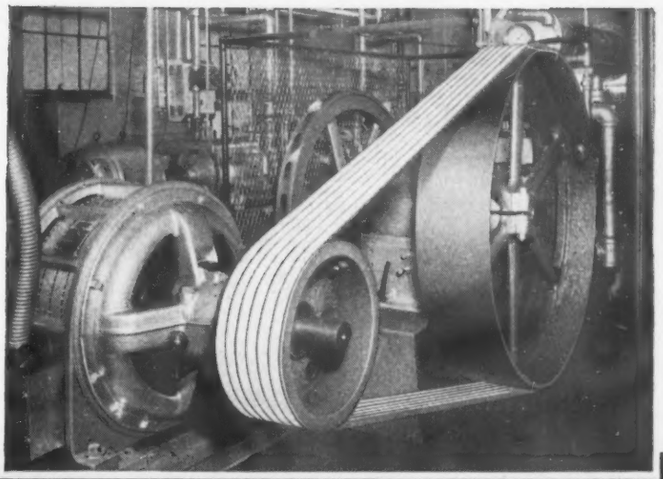
it's worth knowing why this is true



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Early in the war it was found that our Army's tanks, tractors and self-propelled big guns in combat service required V-belts far superior in strength and durability to any V-belts ever built before. Gates developed these greatly superior V-belts through intensified, specialized research —and here is why this fact is now important to YOU:—

Here is why—

Every improvement developed by Gates for U. S. Combat Units—and many later improvements, also—have been added, day by day, to the quality of the Standard Gates Vulco Ropes which have been delivered to you.

That is why, even while the war was still in progress, you were getting in your Standard Gates Vulco Ropes a product built to far higher service standards than any V-belts ever built by anyone before the war.

And that is only half the story. Through continuing specialized research, the service qualities of these superior Gates Vulco Ropes have been still further improved as all of Gates facilities and energies have been returned to the service of industry.

These are the simple reasons why the standard Gates Vulco Ropes you are getting today are delivering far better service than any V-belts ever built before!

All Gates V-Belts are Built With *The Patented* **CONCAVE SIDE**

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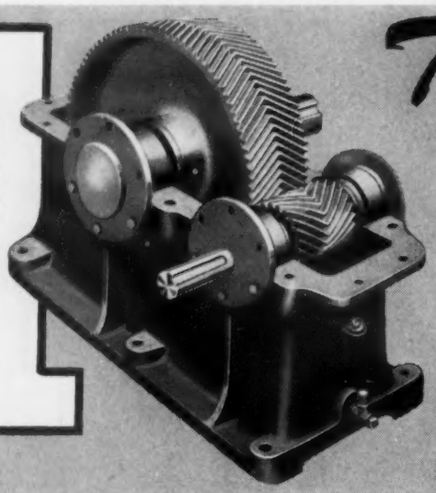
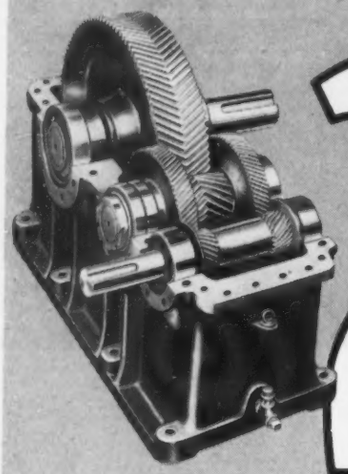
1-2-3

1 SINGLE REDUCTION

Standard Ratios from 1.75 to 1 up to 10 to 1 Ratings from .8 H. P. to 2820 H. P.





2 DOUBLE REDUCTION

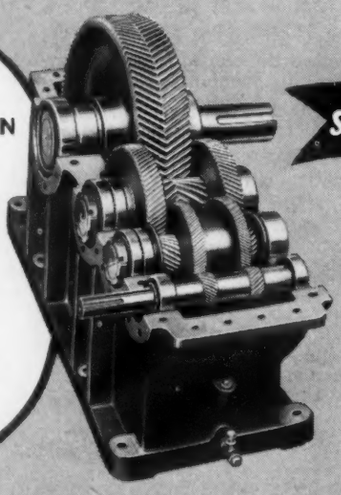
Standard Ratios 10 to 1 up to 69 to 1. Ratings from .52 H. P. to 1200 H. P.

These Units are built in three general classes, single, double and triple reduction types, determined by the number of gear trains used. Each type covers a wide range of sizes and ratios. From this complete line practically any equipment can be provided with the right operating speed, as standard ratios range from 1.75 to 1 up to 320 to 1. These units are also suited for speed increasing.

Helical and herringbone type gears give high capacity and efficiency with smooth tooth action. Symmetrical arrangement of gears reduce shaft stresses and eliminates end thrusts. Pinions are heat treated alloy steel, gears heat treated carbon steel. All shafts are mounted on ball or roller bearings. Efficiencies up to 98% are obtained.

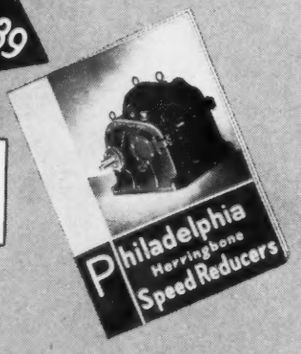
3 TRIPLE REDUCTION

Standard Ratios 60 to 1 up to 320 to 1. Ratings from .19 H.P. to 555 H.P.



send for catalog H-39

Other outstanding features of these units are explained in our catalog H-39. Write for a copy on your business letterhead.



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ONE PURPOSE >> THE IMPROVEMENT OF METALS BY FORGING

Forged oil well drilling tool part in which grain structure and fibre-like flow lines inherent in steel have been utilized fully to obtain the maximum of metal qualities required to endure severe service conditions. Does not this sample indicate how parts in your product might be improved?

● High tensile and impact strength, toughness, and fatigue and wear resistance are qualities required in oil well drilling tools. They are obtained in the exact degree required by forging tough steels. Forging tough steels and other metals in closed impression dies develops maximum metal quality by controlling, directioning and concentrating grain structure to meet stresses, shocks and pressures as they occur under actual service conditions. A broad experience in employing the most suitable forging technique for obtaining the maximum IMPROVEMENT OF METALS BY FORGING is the vital element. Ask a Steel Improvement Forging Engineer about forging techniques by which high tensile and impact strength, toughness and fatigue resistance are being developed fully in numerous so-called "impossible-to-forge" designs. *Get the full benefit of over 32 years of venturesome forging production experience.* A product fortified by forgings out-performs and out-sells other products. Write or phone for engineering service.

* * *

Reference Data Booklet presents many new ideas on forgings and their applications in many different types of equipment. Copies available to engineers, metallurgists and executives.

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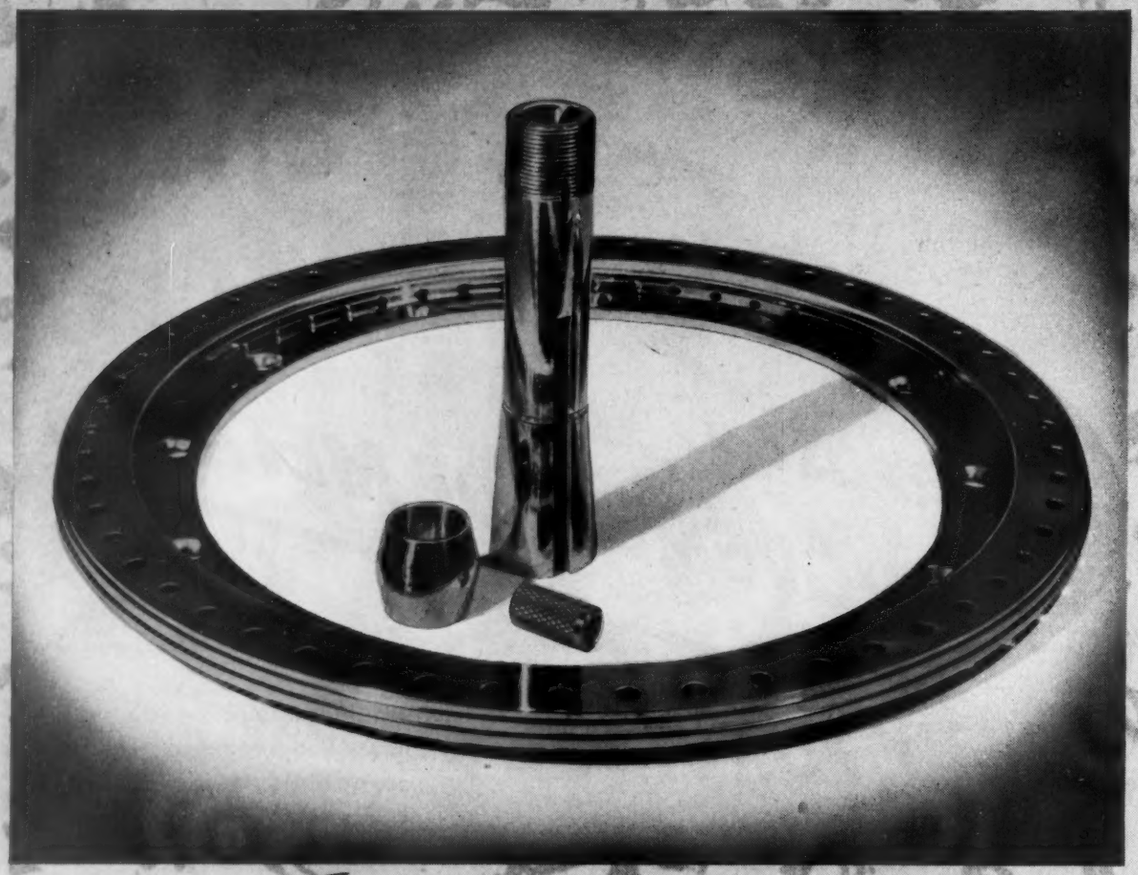

If limited space is your problem, the sleeve bearing requires less radial room than any other type. Every month millions of Bunting Cast Bronze Bearings go into service where space is so limited that a sleeve bearing is the only type capable of meeting the requirement. Our engineers are at your service. The Bunting Brass & Bronze Company, Toledo 9, Ohio. Branches In Principal Cities.

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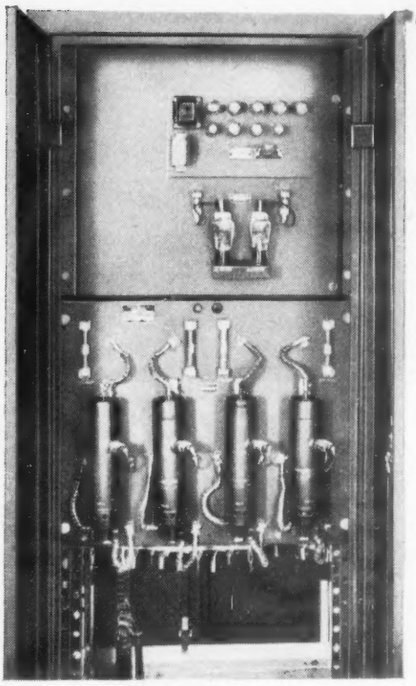
10-HOUR BALANCING JOB *cut to 5*

Armature-balancing frame at Mare Island Shipyard, equipped with G-E Thy-mo-trol drive



Interior of Thy-mo-trol control panel. Rectifier tubes convert a-c to controlled d-c.

...by ELECTRONIC *Speed Control*

To balance the heavy armatures of the motors that power Navy submarines, test runs must be made over a wide range of speeds, with frequent stops and starts as weights are readjusted. Always a precision job at the Mare Island Navy Yard, armature balancing is now a *fast* precision job, thanks to a G-E Thy-mo-trol drive on the balancing machine.

The speed for any run is just preset on a dial, and the drive automatically and smoothly accelerates the armature up to this speed. Manual adjustments which were formerly a two-man operation are no longer necessary.

Again, when the stop button is pressed, the drive performs an electric braking function, bringing the armature on test to a stop in a matter of seconds, as compared with two to four minutes required previously. This permits an entire testing cycle to be completed in 37 seconds!

OPERATES FROM A-C POWER

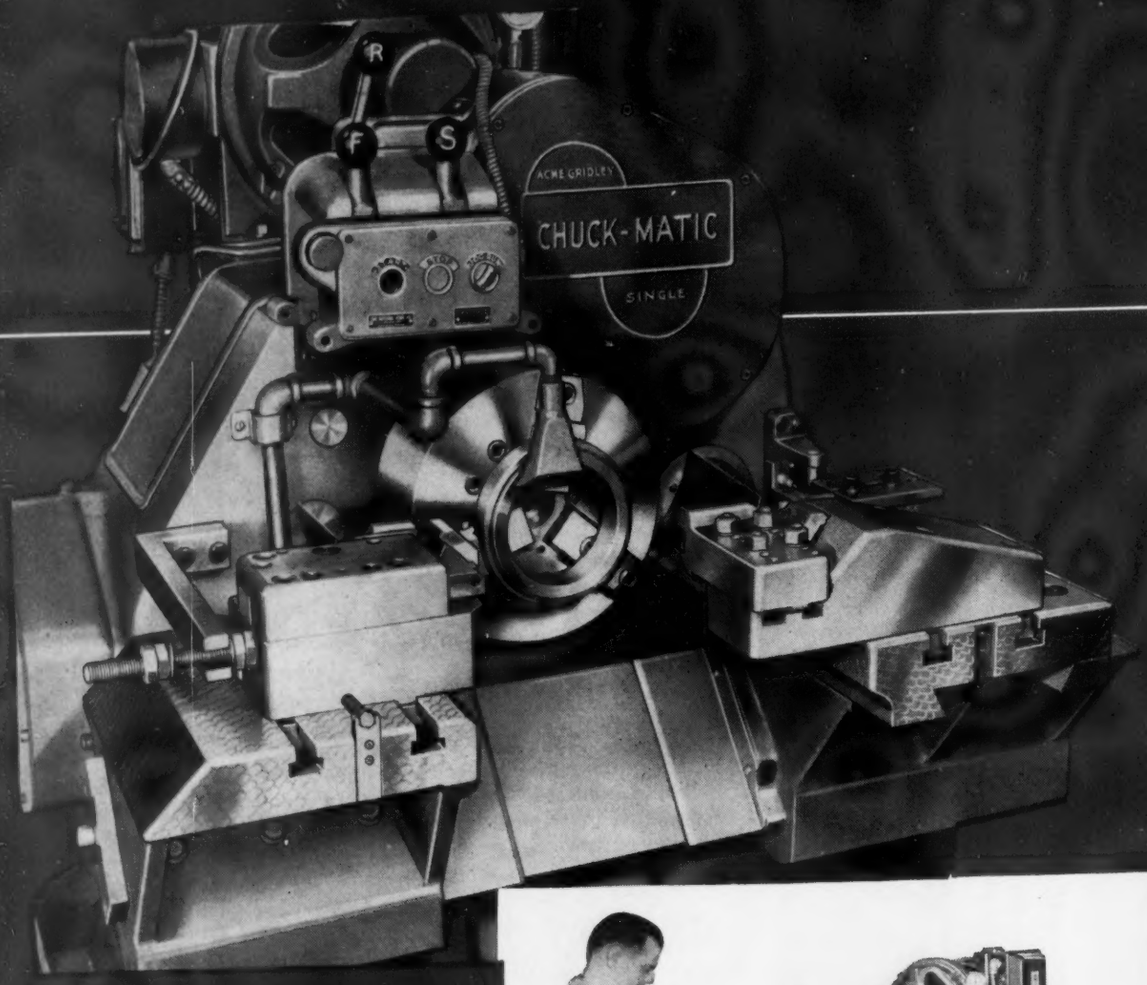
Saving time on testing machines is only one of hundreds of jobs now being found for Thy-mo-trol drives—on machine tools, processing equipment, and wherever stepless control of speed is an advantage. Standard Thy-mo-trol drives are available from 1/8 to 25 hp, and larger sizes can be furnished. All are operated directly from an a-c power supply.

Each Thy-mo-trol drive is a completely co-ordinated equipment, including d-c motor, electronic panel, transformer, and control station. G-E engineers will help you select and apply Thy-mo-trol drives to your machines, or explore their suitability for new functions. Ask for Bulletin GEA-4025. Apparatus Dept., General Electric Company, Schenectady 5, N. Y.

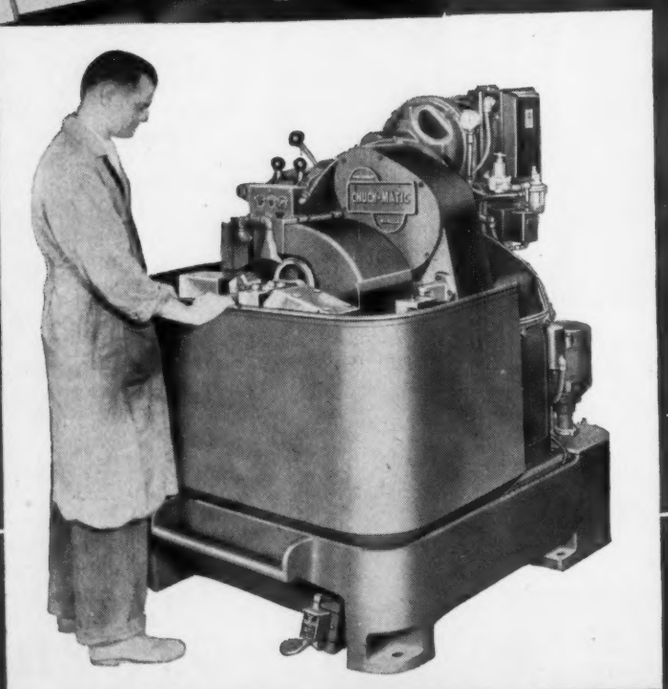
THY-MO-TROL *Drive*

GENERAL ELECTRIC

A *New* National Acme Machine..



RADICALLY DIFFERENT FROM ANY OTHER SINGLE SPINDLE MACHINE



..the Acme-Gridley
CHUCK-MATIC
SINGLE SPINDLE 12" CHUCKER

For heavy duty, high production work on castings, forgings and tubing parts. Specializes on such primary operations as straight or taper boring, form boring or form turning, drilling, turning, forming, facing and chamfering.

The 12" Chuck-Matic is an entirely new design. It is an air-operated automatic, especially suited to cutting machine costs on short runs as well as long runs.

IT IS RUGGED—Heavy frame and new design gives you every advantage of modern tooling methods. Maintains precision, undisturbed by heavy feeds with high speed or carbide tipped tools.

IT IS FAST—Idle movements are cut to the minimum. Setup is quick and easy. Quick change from job to job. Adjustments easy through unusual accessibility.

UNSKILLED OPERATORS can run it. Automatic safety devices control both manual functions and mechanical movements—protecting operator, work and machine.

SPACE SAVING is a special advantage. Floor space required, 45" x 64". Convenient to locate. Operator can tend as many machines as job cycle times will permit.

★

THIS NEW BOOK—Bulletin SC-46 gives you complete details and specifications. Send for your copy.

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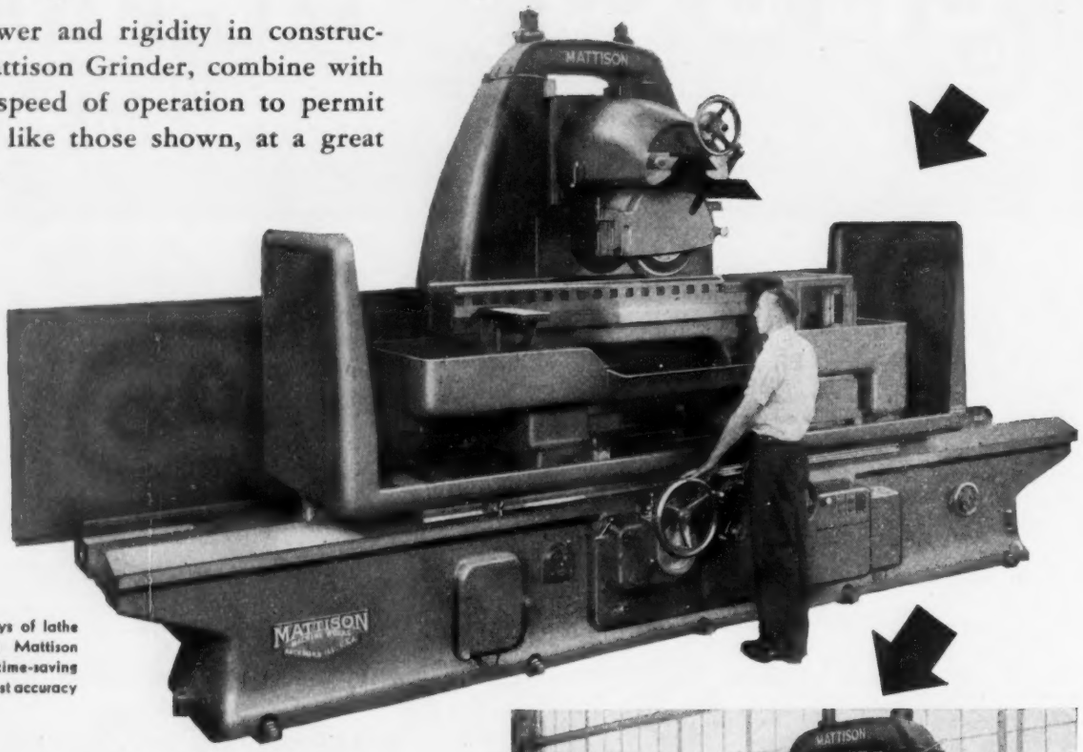
Acme-Gridley 4-6 and 8 Spindle Bar and Chucking Automatics • Single Spindle Automatics • Automatic Threading Dies and Taps • The Chronolog • Limit, Motor Starter and Control Station Switches • Solenoids Centrifuges • Contract Manufacturing

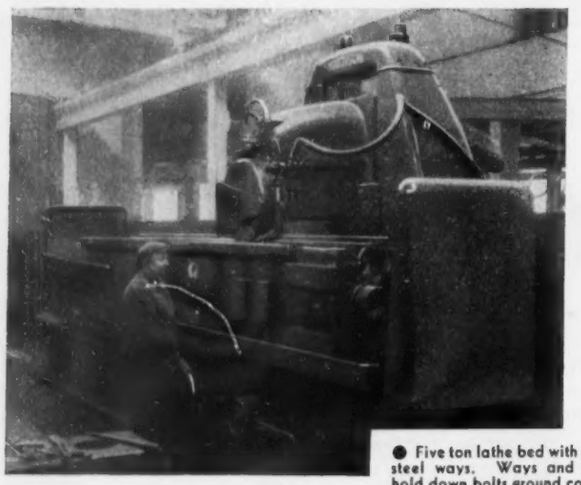
PRECISION SURFACE GRINDING ON A *Big Scale*

Mattison Surface Grinders are providing a fast, economical and exceedingly accurate method for finishing parts weighing up to several tons in weight.

The High-Power and rigidity in construction of the Mattison Grinder, combine with accuracy and speed of operation to permit handling jobs like those shown, at a great saving of time.



● V-shaped and flat ways of lathe bed being ground on a Mattison Grinder. A practical and time-saving method for grinding to utmost accuracy and smooth finish.



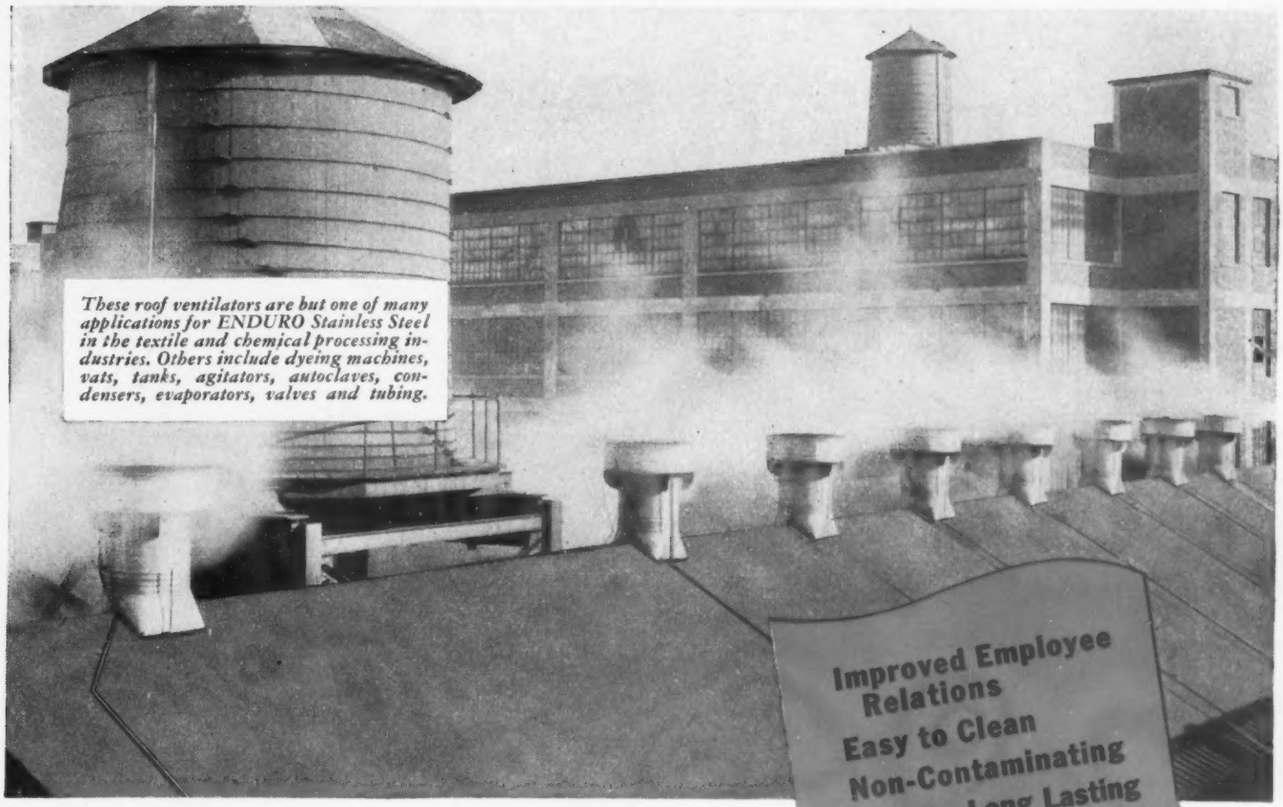
● Five ton lathe bed with hardened steel ways. Ways and heads of hold down bolts ground complete in one setting. Time is saved, a more accurate job is obtained.

● Mattison High Powered Precision Surface Grinder finishing 2½ ton machine bed in 60% less time than by former method.

Write for Free Set-up Book containing further examples, showing how others have reduced time and cut costs with Mattison Grinders.

MATTISON MACHINE WORKS

ROCKFORD • ILLINOIS



These roof ventilators are but one of many applications for ENDURO Stainless Steel in the textile and chemical processing industries. Others include dyeing machines, vats, tanks, agitators, autoclaves, condensers, evaporators, valves and tubing.

Enduro Pays in many ways

- Improved Employee Relations
- Easy to Clean
- Non-Contaminating
- Strong—Long Lasting
- Resistant to Rust and Corrosion
- Resistant to Heat
- Easy to Fabricate
- Universal Acceptance
- Low Ultimate Cost

Among the major reasons why Republic ENDURO Stainless Steel is a "natural" material for chemical and textile processing applications is its inherently high resistance to rust and corrosion.

Consider the case of these textile dyeshop roof ventilators. When made of ordinary steel, the high cost of replacing corroded ventilators every six months was dwarfed by the costly annoyance of rusty drippings which contaminated dyes and damaged materials.

After they were made of long-lasting ENDURO, however, these ventilators ceased being a source of constant maintenance and replacement expense. Rusty drippings were ended.

Perhaps you, too, have applications in which this and other ENDURO advantages effectively can reduce operating overhead. Talk to your equipment manufacturer, or write us for complete information:

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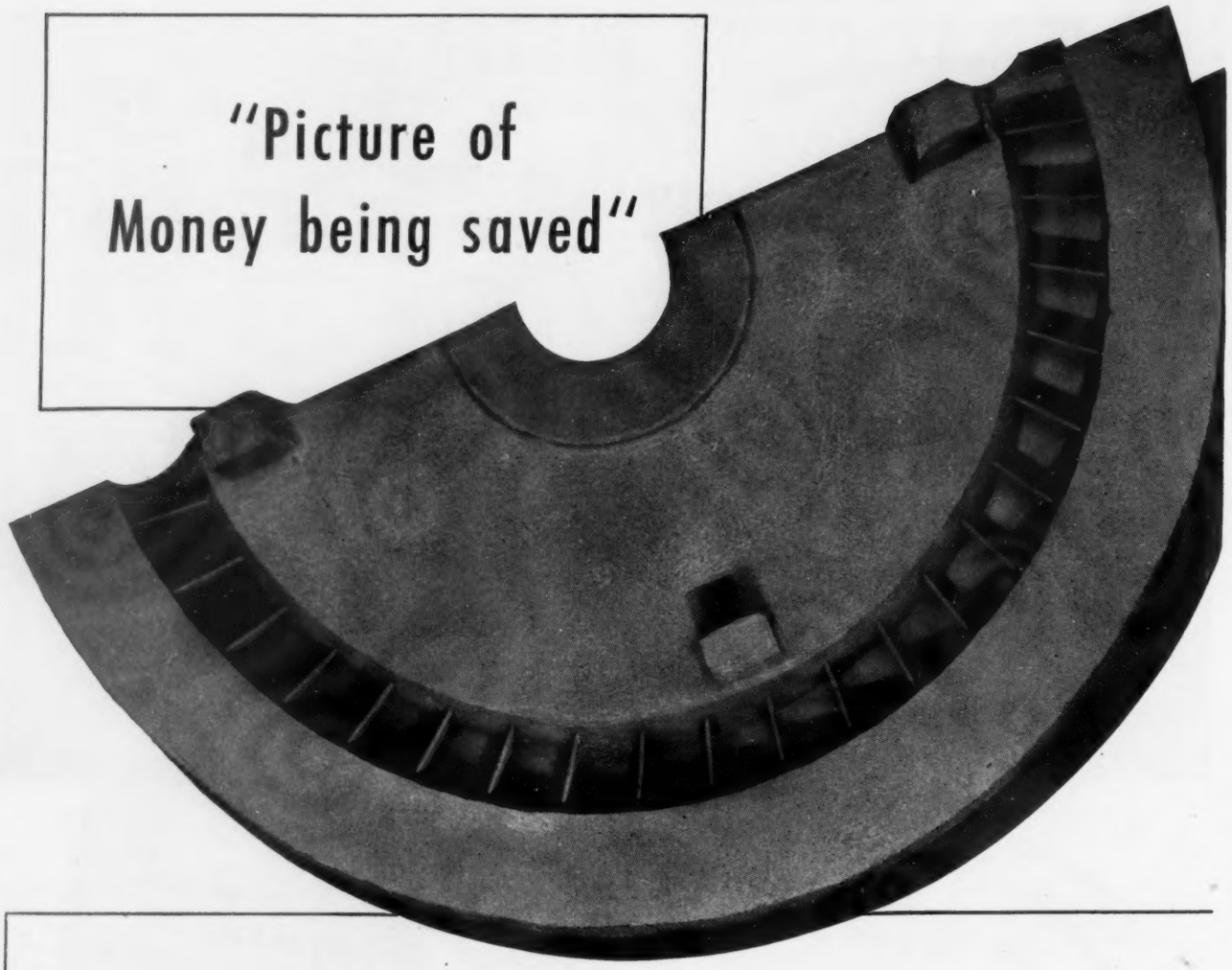
"Picture of Money being saved"



Stainless steel blades are cast right into this cast steel turbine diaphragm—blades spaced to a limit of 1/64″ tolerance on a circular pitch.

These diaphragms are used in pairs and must withstand high steam pressures and temperatures.

Formerly, these diaphragms were fabricated, with each blade set in by hand—a costly and time-consuming operation.

Here is another example of the extreme flexibility and versatility of the casting process—the modern method of making things better and at lower cost.

Why not investigate? The use of more steel castings may improve the product you make and cut your costs, too.

Consult your steel foundryman when planning new products, or redesigning old ones. He will tell you about new techniques, the outgrowth of organized research, which enable you to specify any properties of steel your work requires.

Or, if you prefer, write to Steel Founders' Society, 920 Midland Building, Cleveland 15, Ohio.

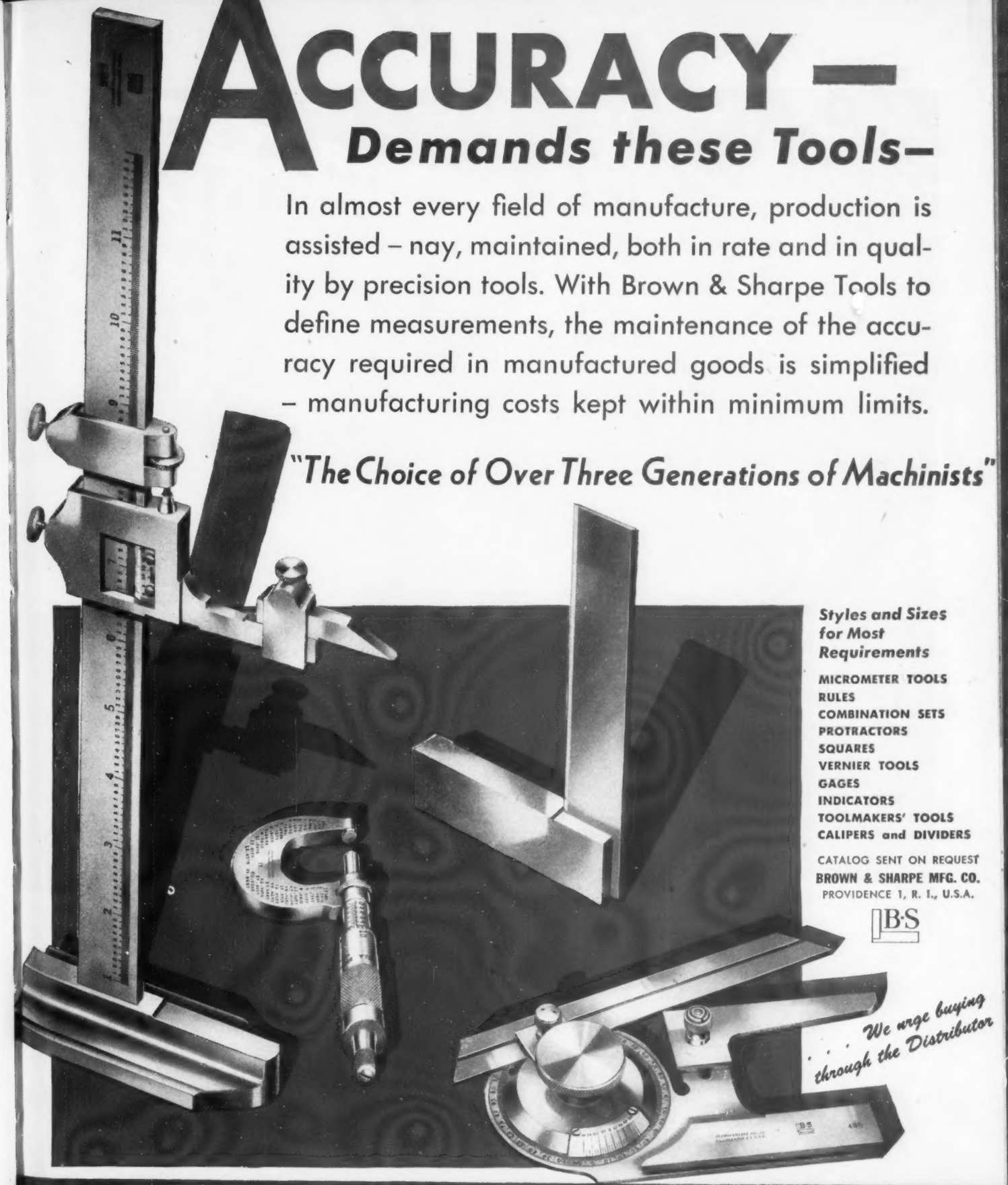
MODERNIZE AND IMPROVE YOUR PRODUCT WITH

STEEL CASTINGS

ACCURACY —
Demands these Tools—

In almost every field of manufacture, production is assisted – nay, maintained, both in rate and in quality by precision tools. With Brown & Sharpe Tools to define measurements, the maintenance of the accuracy required in manufactured goods is simplified – manufacturing costs kept within minimum limits.

"The Choice of Over Three Generations of Machinists"



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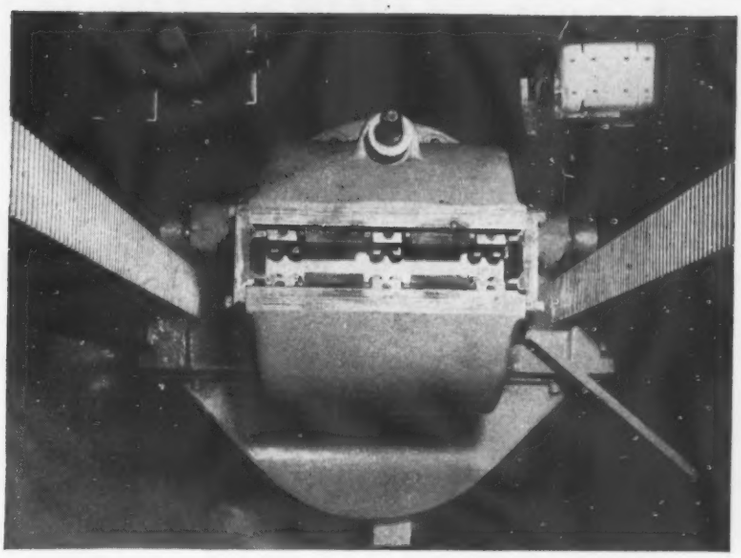
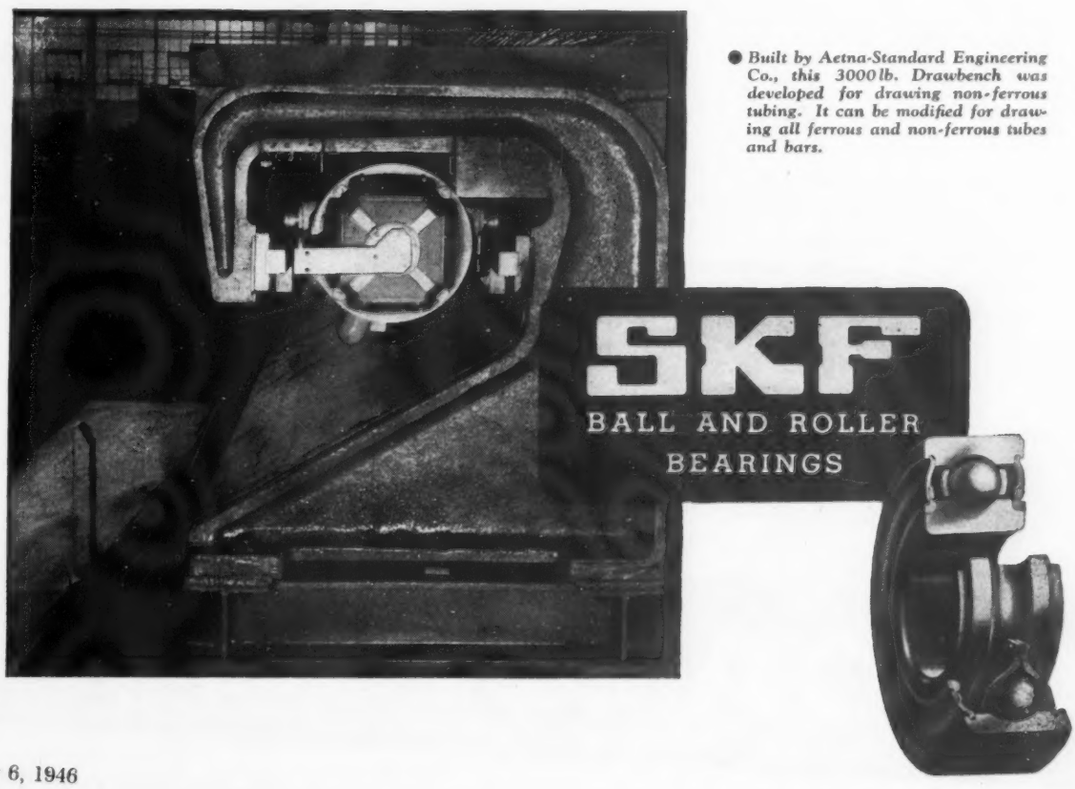


100% SKF-EQUIPPED DRAWBENCH

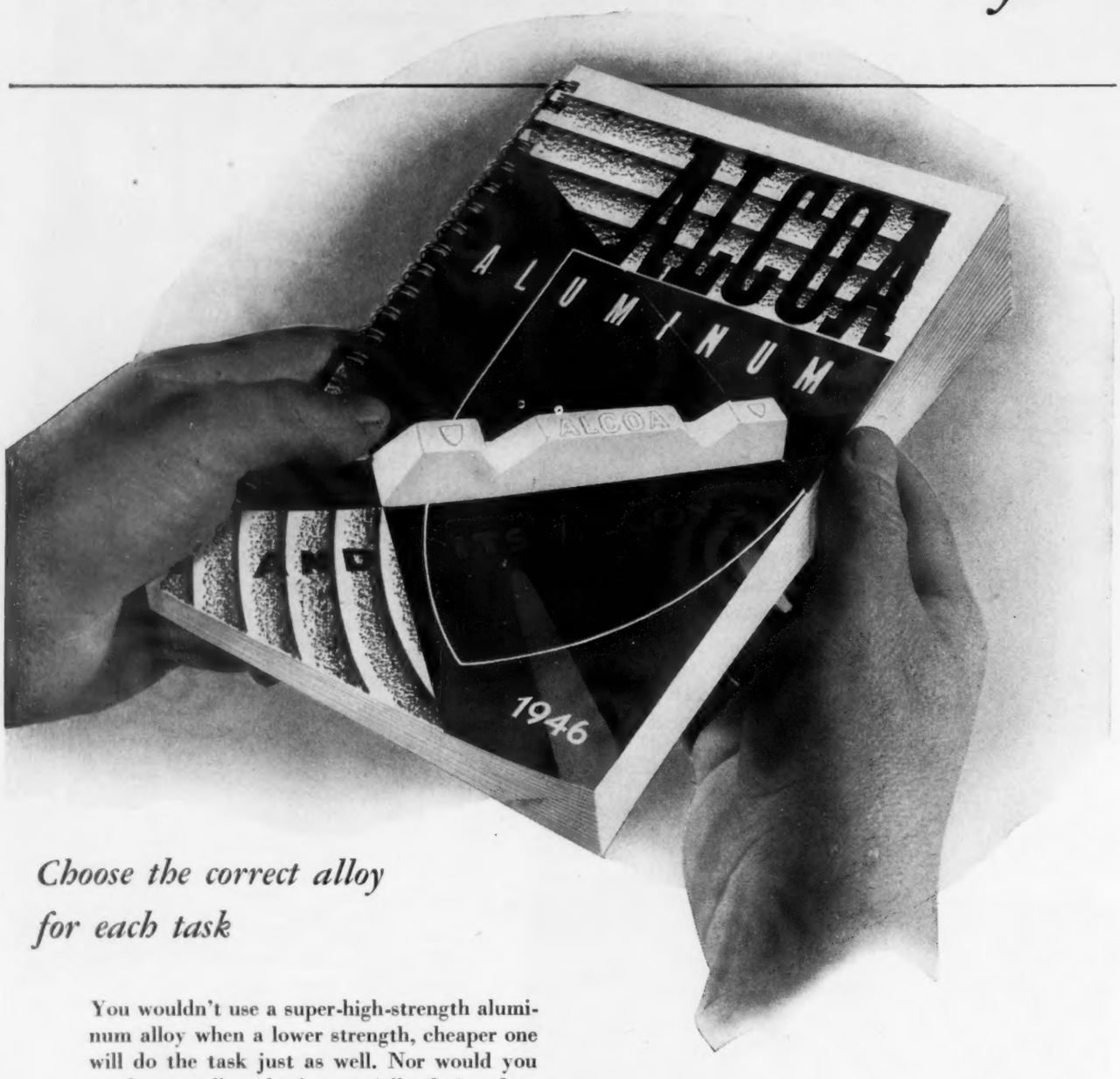
Thirty-four SKF Ball Bearings are located on drive and track wheels of this rack-type Drawbench built by Aetna-Standard Engineering Co. Each has excellent load capacity because balls and raceways closely conform. And each is sealed, without width increase, against dirt and lubricant leakage. They require no adjustments, and will show no wear. For smooth performance year after year, let SKF supply the right bearing for the right place. 6034

SKF INDUSTRIES, INC., PHILADELPHIA 34, PA.



● *Built by Aetna-Standard Engineering Co., this 3000 lb. Drawbench was developed for drawing non-ferrous tubing. It can be modified for drawing all ferrous and non-ferrous tubes and bars.*

Alcoa Aluminum IS A LOT OF *Alloys*



Choose the correct alloy for each task

You wouldn't use a super-high-strength aluminum alloy when a lower strength, cheaper one will do the task just as well. Nor would you employ an alloy that's especially designed to withstand outdoor exposure when all it's asked to do is "look pretty" at some inside location. And so on—

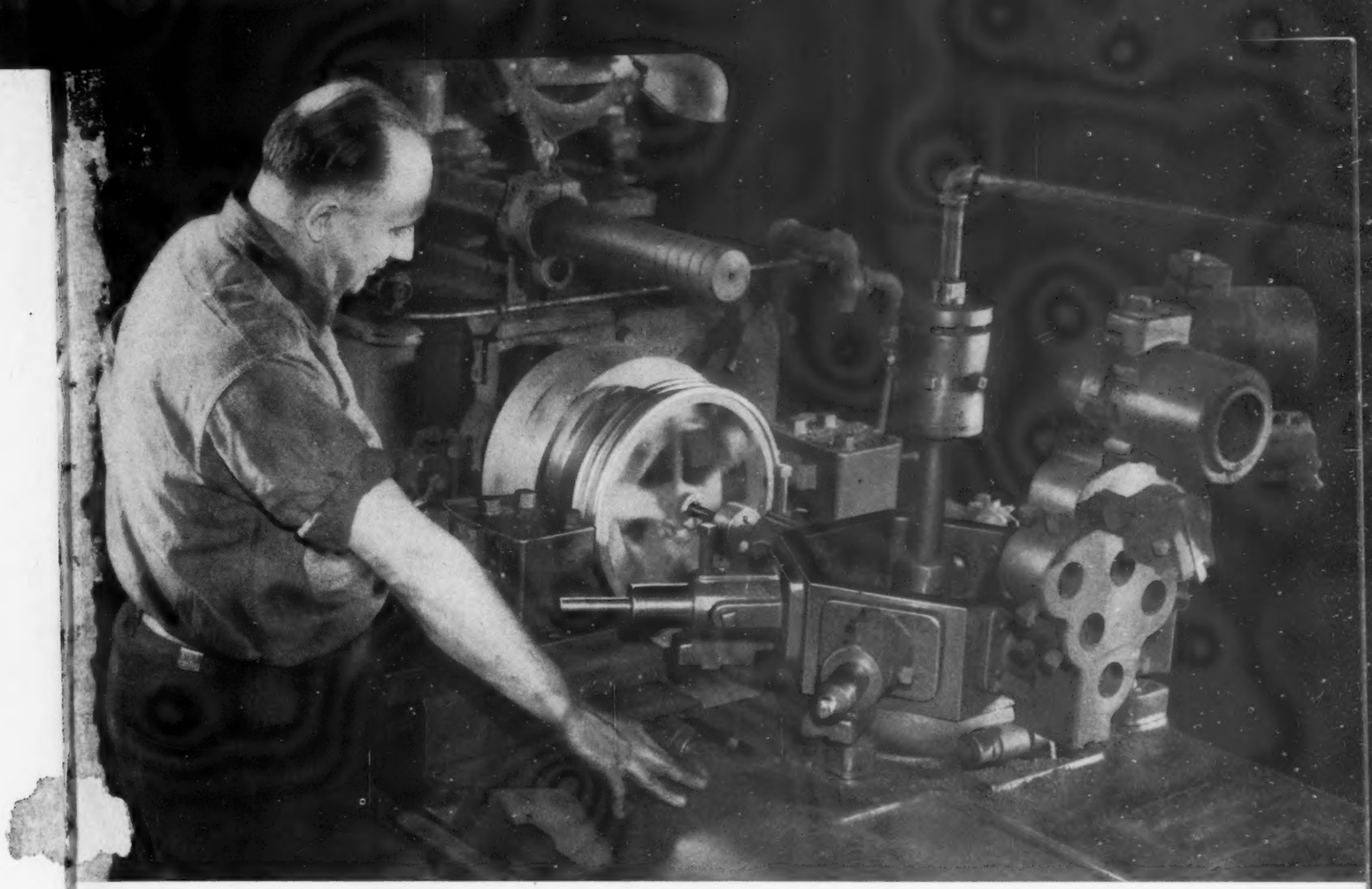
You spend less money when you're correctly advised on the selection of materials. Which is where Alcoa engineers fit into the picture. Calling on their years of experience in developing, testing and fabricating aluminum alloys, they are usually able to say, "That's the alloy to use." You get into production without delay.

To help you select aluminum for the usual jobs, Alcoa offers the book, "Alcoa Aluminum and its Alloys." For a free copy, write:

ALUMINUM COMPANY OF AMERICA, 2112 Gulf Building, Pittsburgh 19, Pennsylvania.

ALCOA FIRST IN **ALUMINUM**

ALCOA ALUMINUM



Production Trebled
when the *FASTERMATIC* took over!

Note the rather simple tooling arrangement for machining cast iron sheaves on this Fastermatic. The set-up, similar to regular turret lathe work, is made just as easily. But here, the machine performs 15 different operations—completes the entire machining job in 13 minutes. Former time was 39 minutes.

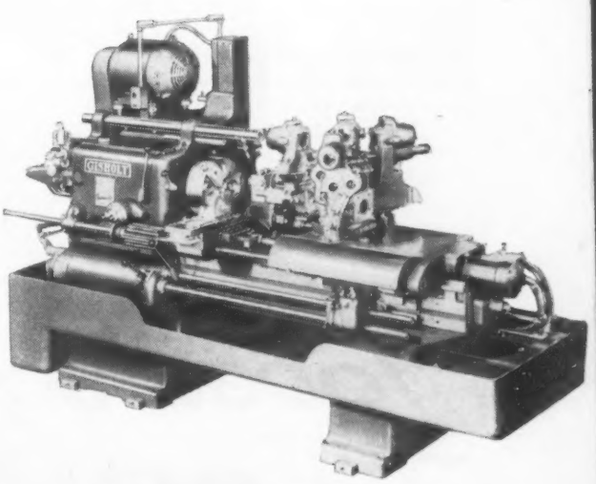
Completely Automatic Cycle

It's the swift, automatic cycle of the Fastermatic that accounts for such substantial time-savings. With its hydraulic feed system and automatic speed control, the operator has only to load the chuck, start the machine and remove the finished work. And usually, the operator has time to tend a second machine.

Now, when you need still greater production, is a good time to look into the Fastermatics. Ask for complete information.

Rough Casting

Finished Sheave



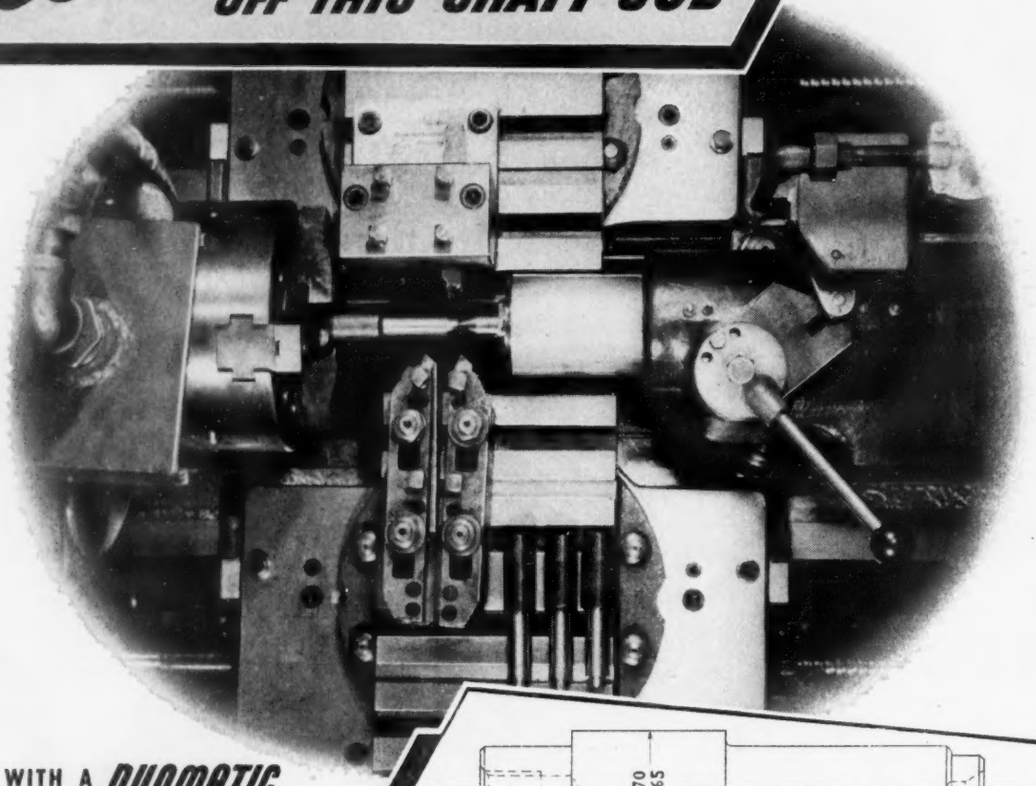
The Fastermatics *are universal automatic turret lathes. Designed for accurate, high production turning, they can also be economically used on comparatively small lot work. Write for literature.*

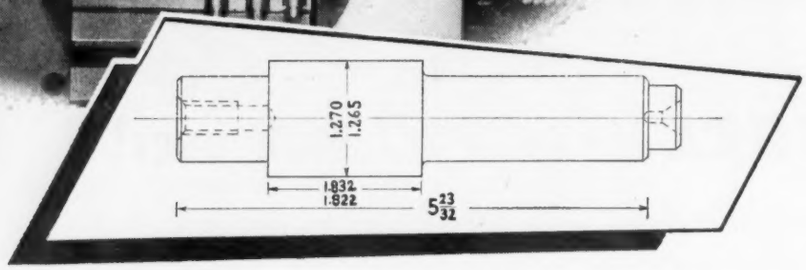
GISHOLT MACHINE COMPANY
1217 E. Washington Ave. • Madison 3, Wisconsin

Look Ahead...Keep Ahead...with Gisholt

TURRET LATHES • AUTOMATIC LATHES • SUPERFINISHERS • BALANCERS • SPECIAL MACHINES

2A DUOMATIC CUTS 37 HOURS OFF THIS SHAFT JOB





DO IT WITH A *DUOMATIC*
the LATHE with a
MAN INSIDE

To set up and run 500 pieces in two operations on this part required 55 hours on an engine lathe. On the 2A Duomatic the two operations (setups and 500 pieces) took only 18 hours . . . 37 HOURS SAVED!

3 BIG REASONS why the 2A Duomatic makes such remarkable savings in time and costs:

1. NO CAMS TO CHANGE CYCLES. Diameters and lengths are automatically changed by simple dial and nut adjustments. Cam costs are out ... setup time is reduced two-thirds.
2. MORE TOOLS DO MORE JOBS AT ONE TIME. Separate tool slides and carriages, front and rear, operate independently or together . . . permit any combination of turning and "in" or "out" facing cycles.
3. RESPONSIBILITY BUILT INTO THE LATHE. The 2A Duomatic is fully automatic . . . enables unskilled operators to handle complex jobs. The worker just loads, starts the cycle, and unloads the workpiece . . . the lathe does the rest.

L & S Engineers can prove how your higher production costs can be reduced sharply with Duomatic Lathes. Write on your company letterhead for detailed bulletins Nos. 601 and 620.

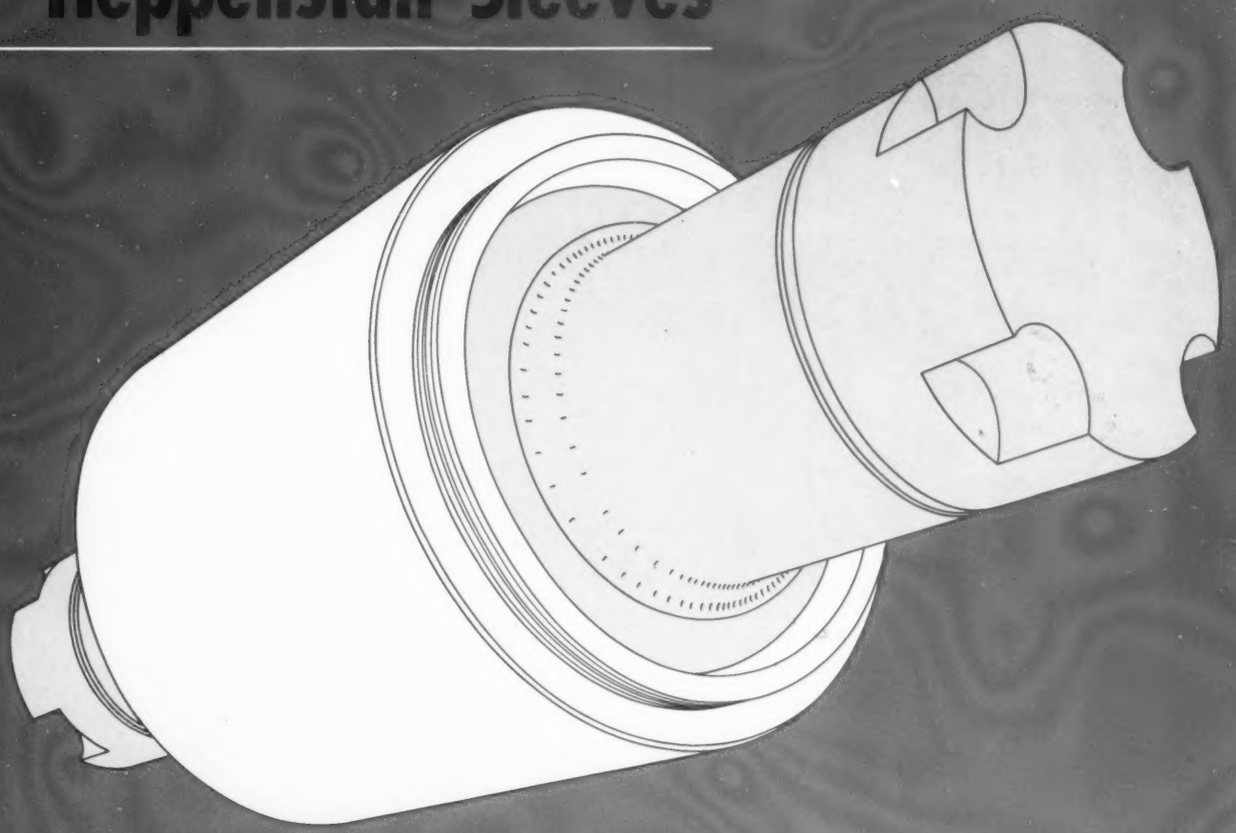
THE LODGE & SHIPLEY MACHINE TOOL CO.

L & S LATHES

CINCINNATI 25, OHIO, U. S. A.

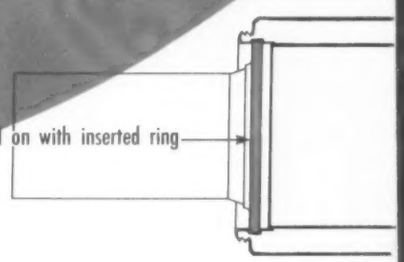
MACHINE TOOL DIVISION 3055 COLERAIN AVE. • SPECIAL PRODUCTS DIVISION 800 EVANS ST.

Heppenstall Sleeves



put back-up roll costs

where they belong



Why scrap a worn back-up roll? Why pay for a solid one when a Heppenstall Sleeve will outwear it? Being a relatively small mass of metal without the necessity of compromising between strength of necks and hardness of surface, Heppenstall Sleeves permit the incorporation of all Heppenstall's skill in metallurgy, forging and heat treating. These sound arguments you may even disregard but you can't dismiss the 16 years of remarkable service records established by Heppenstall Sleeves. Let us tell you the complete story. Heppenstall Company, Pittsburgh, Pa.

the most dependable name in forgings—**Heppenstall**

STILL LOOKING INTO THE FUTURE

YESTERDAY—"Grinding" Set Speed Records!

To remove pads left after riser cutting, foundry men turned to grinding, the fastest method known — yesterday. But grinding couldn't cope with increased production demands.

TODAY—"Flame Scarfing" is Fifty Times Faster!

To meet this challenge, the oxyacetylene industry developed "flame scarfing" — fifty times faster than the method that broke speed records yesterday. In addition, "flame scarfing" requires no large expensive equipment . . . saves money . . . manpower.

—*AND TOMORROW?*

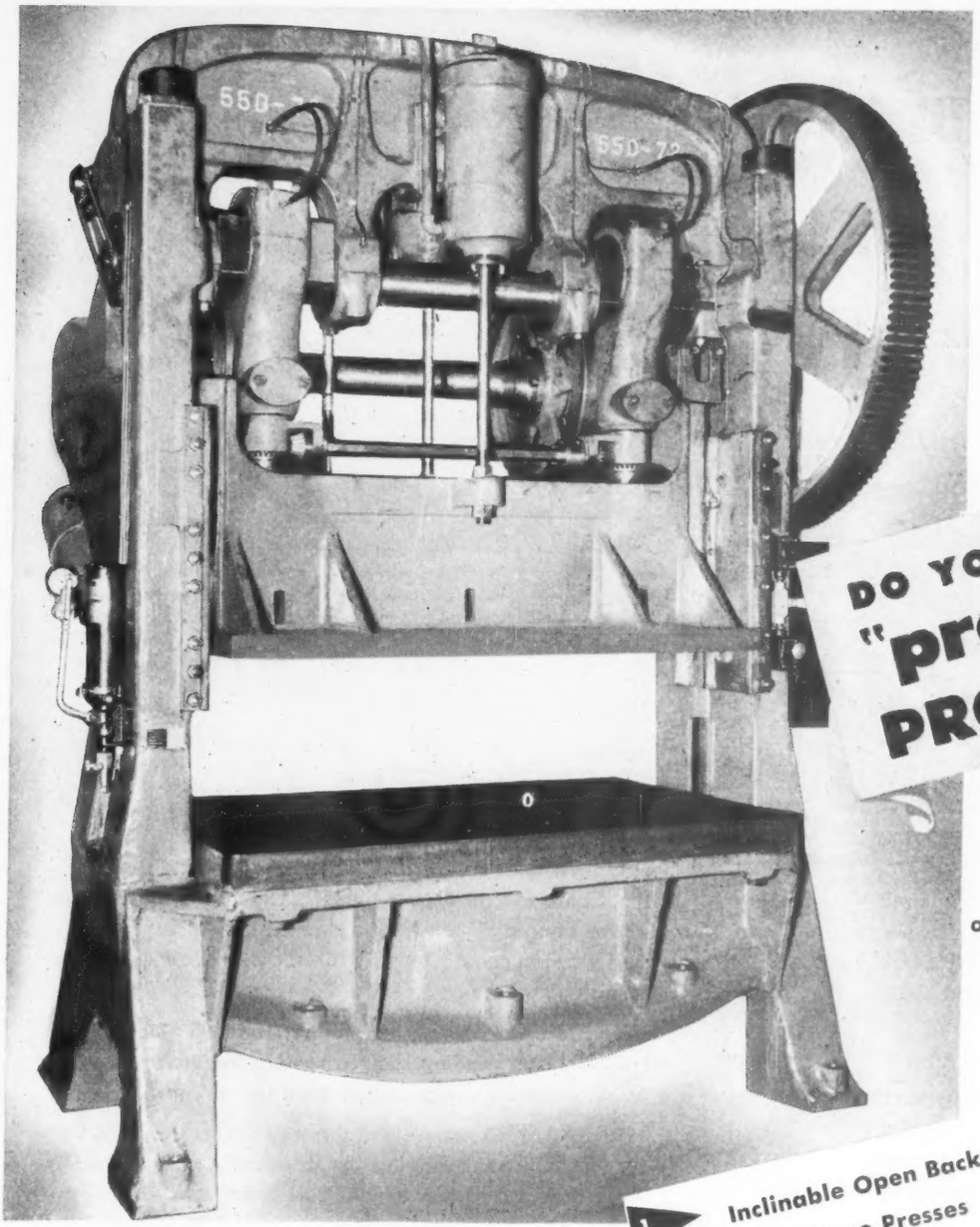
From Airco's research and development staff will come new and better methods aiding steel foundry production — continuing the progressive tradition that has characterized Airco's policy.

Airco's Technical Sales Division is at the call of steel foundry men in applying Airco processes in the solution of their problems. **A copy of an interesting booklet: "New and Improved Oxyacetylene Methods for Steel Foundries" — is available. For your copy of the booklet, and for further information concerning Airco's Technical Service write: Air Reduction, 60 E. 42nd St., New York 17, N. Y. In Texas: Magnolia Airco Gas Products Company, Houston 1, Texas.**

AIRCO **AIR REDUCTION**

Offices in All Principal Cities

ORIGINATORS OF MODERN OXYACETYLENE METHODS FOR STEEL FOUNDRIES



DO YOU HAVE A "pressing" PROBLEM?

THE CLEVELAND PUNCH & SHEAR WK'S CO. U.S.A.

offers eleven types in sizes and capacities to meet your particular needs.

Cleveland Straight Sided Double Crank Presses are built in a wide range of sizes and capacities and the fact that they can be furnished with stroke, die space, bed area and distance between uprights to suit particular requirements, makes them available in an almost unlimited number of combinations.

They are used extensively for punching, forming, stamping, bending, cutting and light embossing, usually of large and irregular shapes.

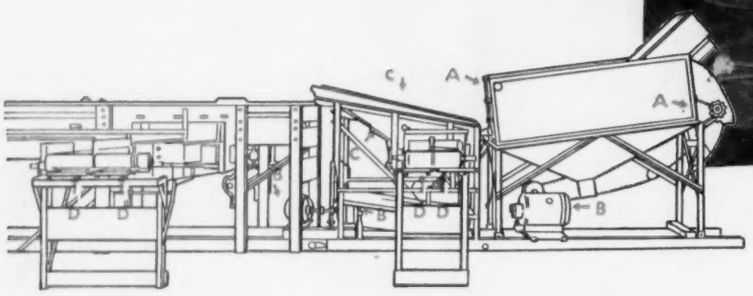
The Press illustrated above has a 4" stroke, 3" adjustment, 48" x 72" bed area, operates at 35 RPM, has a capacity of 110 tons and is equipped with an electrically controlled air operated friction clutch and brake.

1. Inclinable Open Back Presses
2. Punch Type Presses
3. Open Back Gap Presses
4. Trimming Presses
5. Knuckle Joint Presses
6. Straight Sided Crank Presses
7. Straight Sided Eccentric Presses
8. Double Action Toggle Presses
9. Modern Single Point Presses
10. Modern Two Point Presses
11. Modern Four Point Presses

THE CLEVELAND PUNCH & SHEAR WORKS COMPANY · *Cleveland, O.*

New York · Chicago · Detroit Philadelphia · Pittsburgh

This manufacturer found 11 places to save time & money



"Bob" LeDoux, plant foreman, can install nearly 200 studs per hour with the NELSON manual stud welder operating from a standard 400-amp d.c. welding generator. (Some multiple-gun production units weld as high as 2000 studs per hour!)

with NELSON Automatic Stud Welding

A. Drilling, countersinking and hand-welding operations were eliminated by use of NELSON studs to secure washer end plate bearing journals.

B. Drilling and tapping was eliminated on gear boxes by using NELSON studs to secure bearing journals and mounting base.

C. Drilling and countersinking of side plates was eliminated by use of NELSON studs to secure plates to angle-iron frame.

D. Hand-welding of sack hooks was avoided by use of NELSON pointed studs, bent to shape after automatic welding.

PARAMOUNT MANUFACTURING COMPANY at Stockton, California, purchased the NELSON Stud Welder shown above after a demonstration showed them how automatic stud welding could eliminate three costly hand operations on installing bearing journal studs (example A, at left).

WITHIN a few weeks, they found ten more places where NELSON stud welding showed savings in time and cost of 50% and more over previous hand operations.

THIS EXAMPLE is typical of the way new cost-cutting uses for NELSON stud welding are constantly being found in more than 1,000 plants in almost *every type* of industry now using NELSON equipment — convincing evidence that stud welding speed and versatility *does* step up production and reduce costs.

● **INVESTIGATE . . . write or wire *now* for your copy of the NELSON catalog, or to arrange a demonstration of NELSON Automatic Stud Welding in your own shop or plant!**

NELSON
SPECIALTY WELDING EQUIPMENT

NELSON SALES CORPORATION
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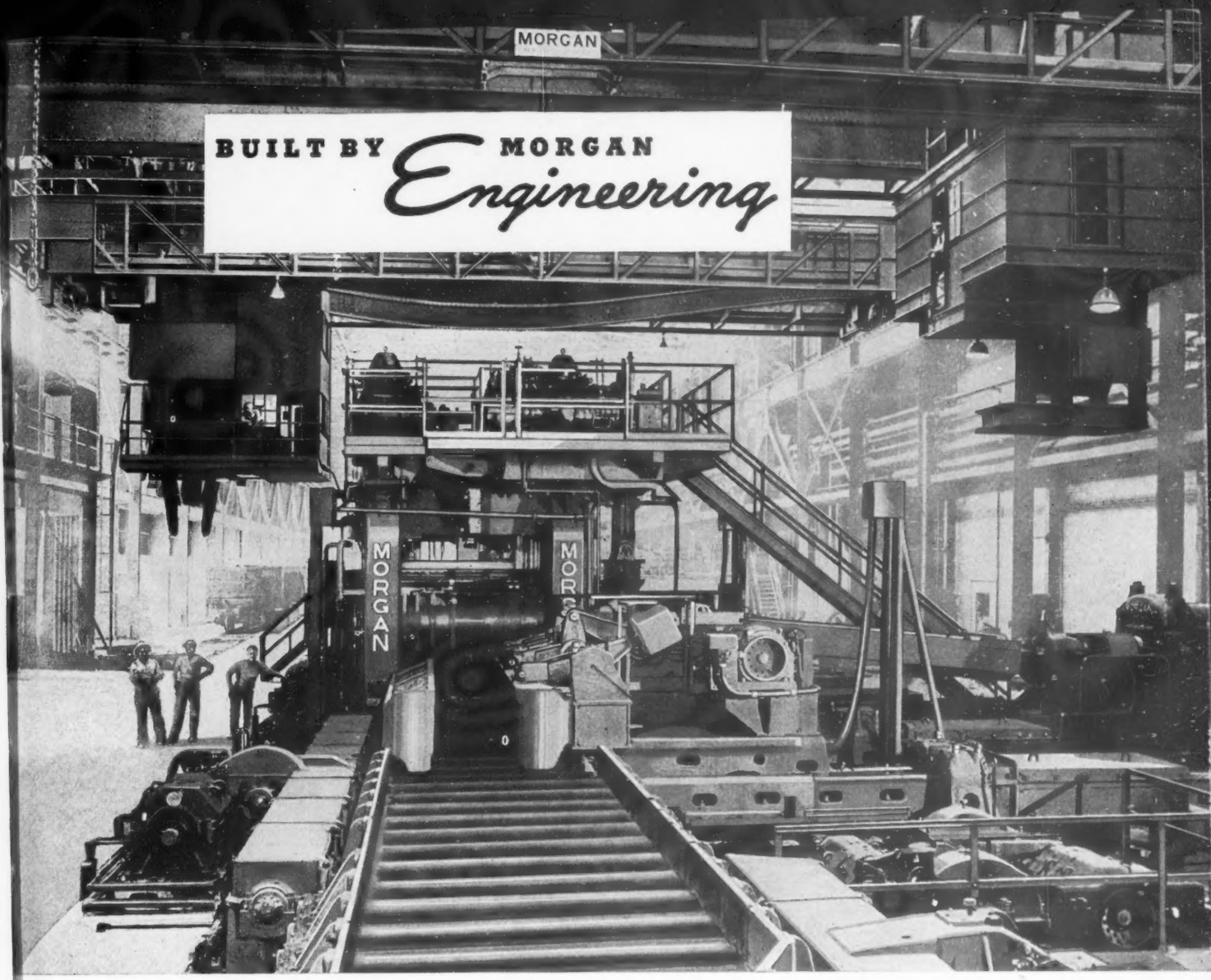
LORAIN, OHIO

Representing
Nelson Stud Welding Corporation, Lorain, Ohio
Nelson Specialty Welding Equipment Corporation, San Leandro, Calif.

TRADEMARK

OTHER NELSON FLUX-FILLED STUDS



MORGAN "36" TWO-HIGH BLOOMING MILL

GROUPED OVER THE MILL IS A MORGAN 7½-TON SOAKING PIT CRANE AND A MORGAN 200-TON 81'-3" SPAN UNIVERSAL TYPE INGOT STRIPPE

With this Mill was furnished Auxiliary Equipment as follows — Front and Rear Tables with Manipulator — Approach Table — Ingot Buggy — Runout Tables — Slab Shear with Gauge — Crop Hoist — Pushers — Conveyor — Skid Bed and Furnace Tables.

Above is shown a Morgan 36" two-high blooming mill complete with double manipulator, front and rear tables. Three mills of this type were recently furnished prominent mid-west steel producers. Housings are one-piece steel castings of the closed top type. Top roll balance is of the counterweight type.

Manipulator is of the overhead type, compact and accessible. Tables are of heavy design, equipped with anti-friction bearings. Screw-down drive is arranged to provide crane hook access when changing guides. Provision is made for automatic lubrication and exclusion of scale and dirt.

THE MORGAN ENGINEERING CO.

ALLIANCE, OHIO. 1420 Oliver Building, Pittsburgh

DESIGNERS • MANUFACTURERS • CONTRACTORS • BLOOMING MILLS • PLATE MILLS • STRUCTURAL MILLS • ELECTRIC TRAVELING CRANES • CHARGING MACHINES • INGOT STRIPPING MACHINES • SOAKING PIT CRANES • ELECTRIC WELDED FABRICATION • LADLE CRANES • STEAM HAMMERS • STEAM HYDRAULIC FORGING PRESSES • SPECIAL MACHINERY FOR STEEL MILLS

P&H

AC-3

CLASS AWS-ASTM
E6013

FOR QUICK, SLICK WELDING JOBS

In production welding — in small welding shops —everywhere it is used, AC-3 quickly wins preference for ease of handling.

AC-3 welds fast . . . lays in smooth, flat beads. Its spray-type arc gives medium penetration — eliminates thin gauge "blow-throughs." Here in one electrode are all the features you want for welding light gauge or heavy steels.

Slag removal is easy — it virtually "curls off." It's used on both AC or DC for all-position work. And with it, you can weld *lighter* metals with *larger* electrodes — you can obtain far greater production. Distortion and under-cutting are at an absolute minimum. Its weld metal seals quickly, making it ideal for poor fits and bridging gaps. Start now to let P&H "AC-3" cut your costs and improve the appearance of your product.

In addition to a line of simplified DC welders, P&H's AC welders range up to 1250 amperes. Each is equipped with creep-proof, micromatic control: WSR (Welding Service Range) ratings specifying the exact amount of *usable* welding current from minimum to maximum. Shown here is the model TWH 500 with a service range of 100 to 625 amperes.

FOR EVERY MILD STEEL REQUIREMENT

There's a production-proved P&H mild steel electrode for every requirement. This partial list shows many that are popular with foremost industries doing large scale-production welding. Get complete information.

SEE YOUR P&H REPRESENTATIVE

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"AC-1"	— AWS — E-6011
"PF"	— AWS — E-6012
"AC-3"	— AWS — E-6013
"FW"	— AWS — E-6020
"DH-2"	— AWS — E-6020
"CM-50"	— AWS — E-7011
"AW-4"	— AWS — E-10012
"AW-2C"	— AWS — E-10020

P&H also has a complete line of Electrodes for welding stainless and alloy steels, as well as for hard surfacing.

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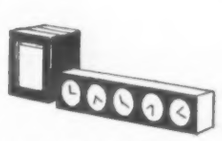
AMERICA'S MOST COMPLETE ARC WELDING SERVICE.

DC Welders

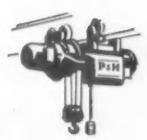
AC Welders

Welding Electrodes

Welding Positioners



Welding Production Control Systems



Electric Hoists

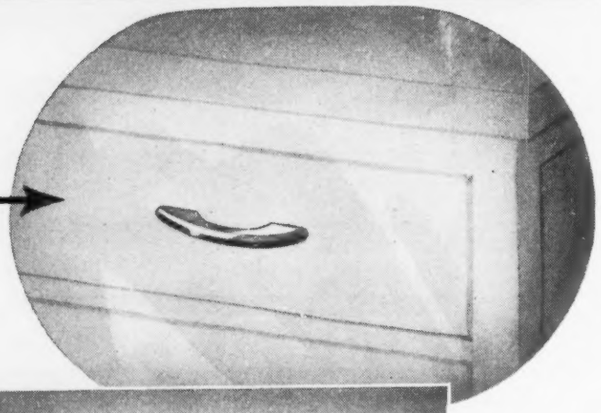
RELIANCE

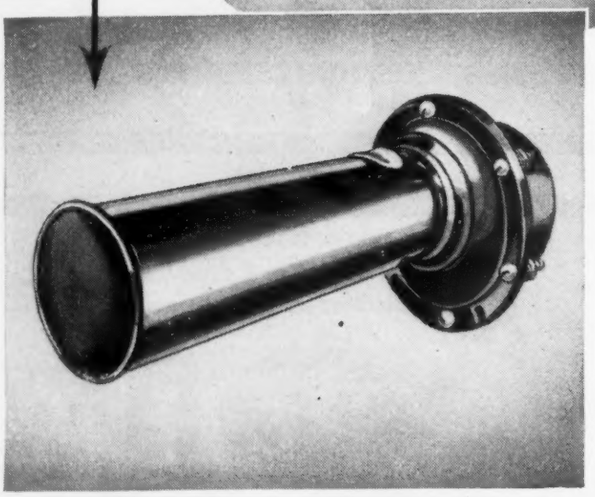
JOB-FITTED STEEL

The Invisible Mark of Quality in Your Product . . .

FROM *Handles*

TO *Horns*





. . . JOB-FITTED TO YOUR PRODUCT

When Reliance Job-Fitted Steel goes into your product, it gives up its own identity but in doing so, it imparts strength, beauty, serviceability and endurance. It makes for speedy, smooth production at low cost.

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Detroit Steel Corporation

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RELIANCE STEEL CORP. OF CANADA, WINDSOR, TORONTO

ALUMINUM SHEETS and STRIPS—available through locations marked*

On many applications of material handling, processing and conveying equipment; mixers and agitators; welding positioners; machine tool drives; testing and calibrating equipment . . . to name only a few . . . variable speed operation makes a tremendous improvement in the quality of the product and the quantity of production as well.

Here's a brand new booklet, 24 pages of helpful information to show you how variable speed operation may be used to increase the flexibility and operating range of many types of equipment.

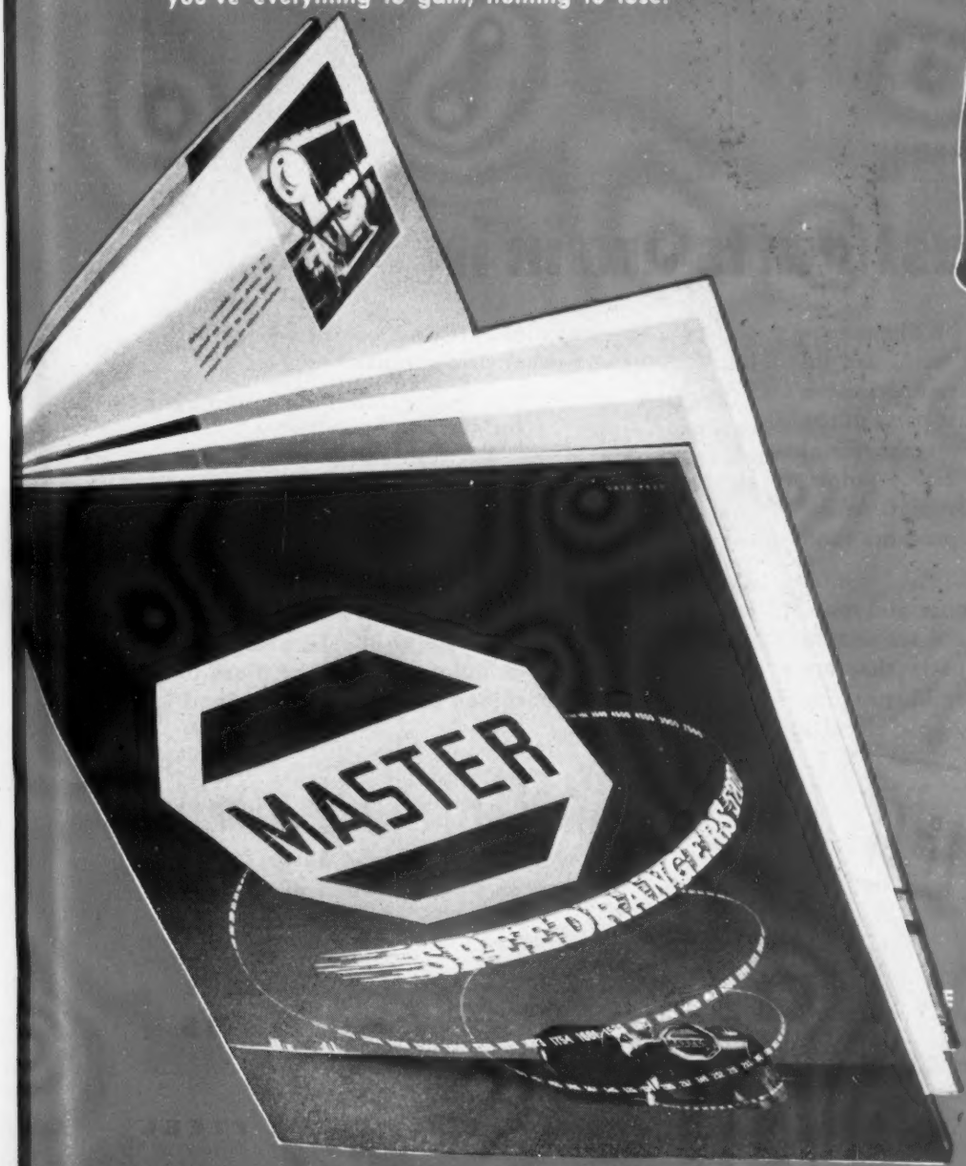
Page after page of application photographs illustrate many types of installations where variable speed operation is most successful . . . illustrations which may suggest major improvements that you can make in your product or plant equipment.

Remember, on many jobs variable speed doesn't cost . . . it pays! This booklet is designed to help you discover where it will pay for you.

Write for Data 7525A on your company letterhead . . . you've everything to gain, nothing to lose.

FOR YOU FOR FREE

24 Pages of Helpful Data



MASTER ELECTRIC COMPANY
DAYTON 1, OHIO

Bronze bushings of two types, cast centrifugally and precision-finished by Shenango-Penn. These and other shapes, many far more complex, are regularly produced here for reasons outlined below.

IT'S A BETTER PLAN.. if Shenango-Penn Centrifugally Cast Parts are in it!

HERE'S WHY! Parts cast centrifugally by Shenango-Penn, and machined by us too, if you wish, are inherently much stronger and tougher, have finer, more uniform grain structure than ordinary cast parts of the same analysis. Centrifugal pressure gives the metal greater density, raises Brinell hardness 2 to 5 points, increases tensile strength by 8 to 20 per cent. At the same time, the Shenango-Penn process prevents sand inclusions, blow holes, porosity.

Those are a few of the reasons why more and more builders of machinery and equipment are turning to Shenango-Penn for all castings and parts that are essentially symmetrical in shape. It's a flexible process, not by any means limited to parts of simple circular section. Many variations are possible including flanges, bosses, lugs and other projections.

Yes, any product plan that includes Shenango-Penn castings instead of ordinary ones is indeed a *better* plan. It always means a more durable product, better able to withstand pressure, friction, abrasion, corrosion and all kinds of stresses. It also means lower production cost. Don't you think it's worth looking into?

Bulletin No. 143 gives full information on Shenango-Penn centrifugal castings including specifications and analyses of the various alloys available, and also tells about our modern machining facilities for those users who desire semi-machined or finished parts. Send for this free bulletin.

SHENANGO-PENN

SHENANGO-PENN MOLD COMPANY

463 West Third Street • Dover, Ohio

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ALL BRONZES • MONEL METAL • ALLOY IRONS

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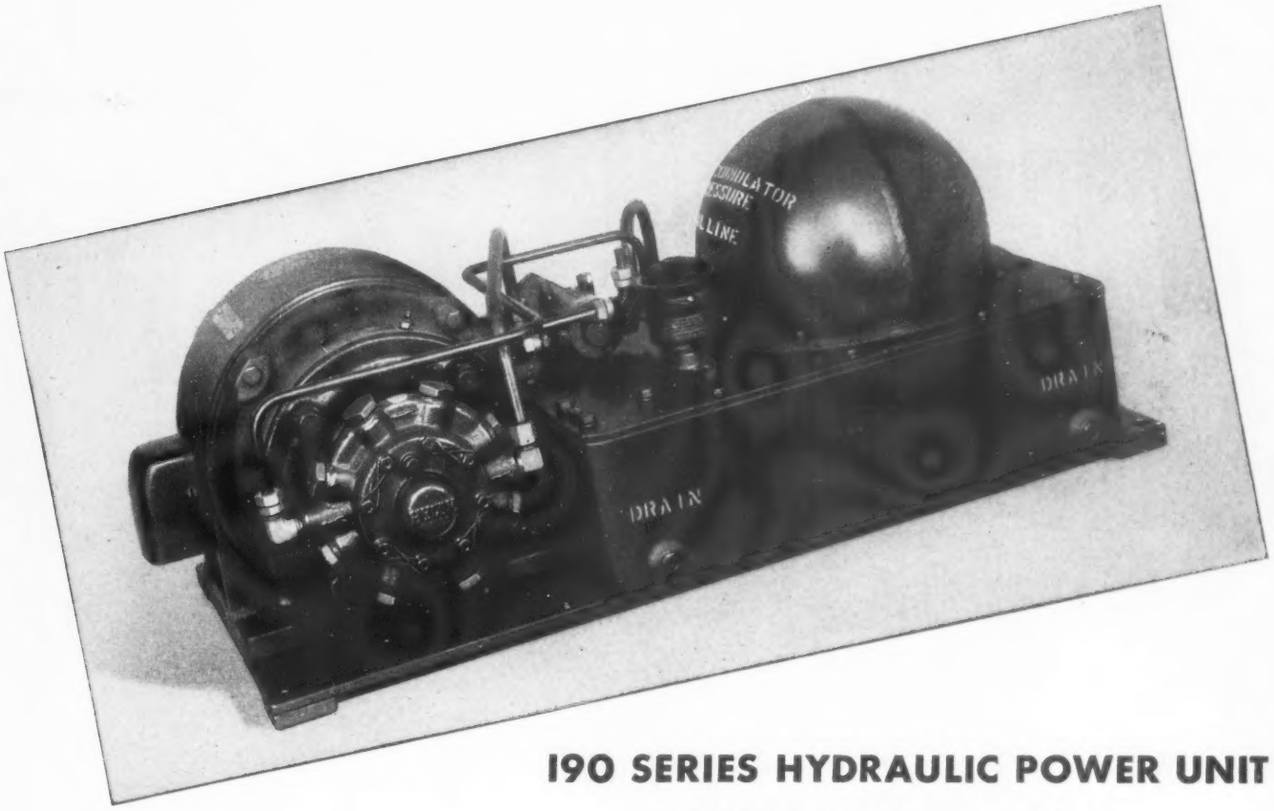
HIGH PRESSURE HYDRAULICS

PUMPS • POWER UNITS • VALVES



190 SERIES HYDRAULIC POWER UNIT

3000 P.S.I. Pump • Motor
Unloading & Relief Valve
10½" Accumulator on 5 Gallon Reservoir

Engineering Service Available without Obligation

For Continuous Operation on:

ROLL BALANCING • PRESSURE SEALS
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THE NEW YORK AIR BRAKE COMPANY

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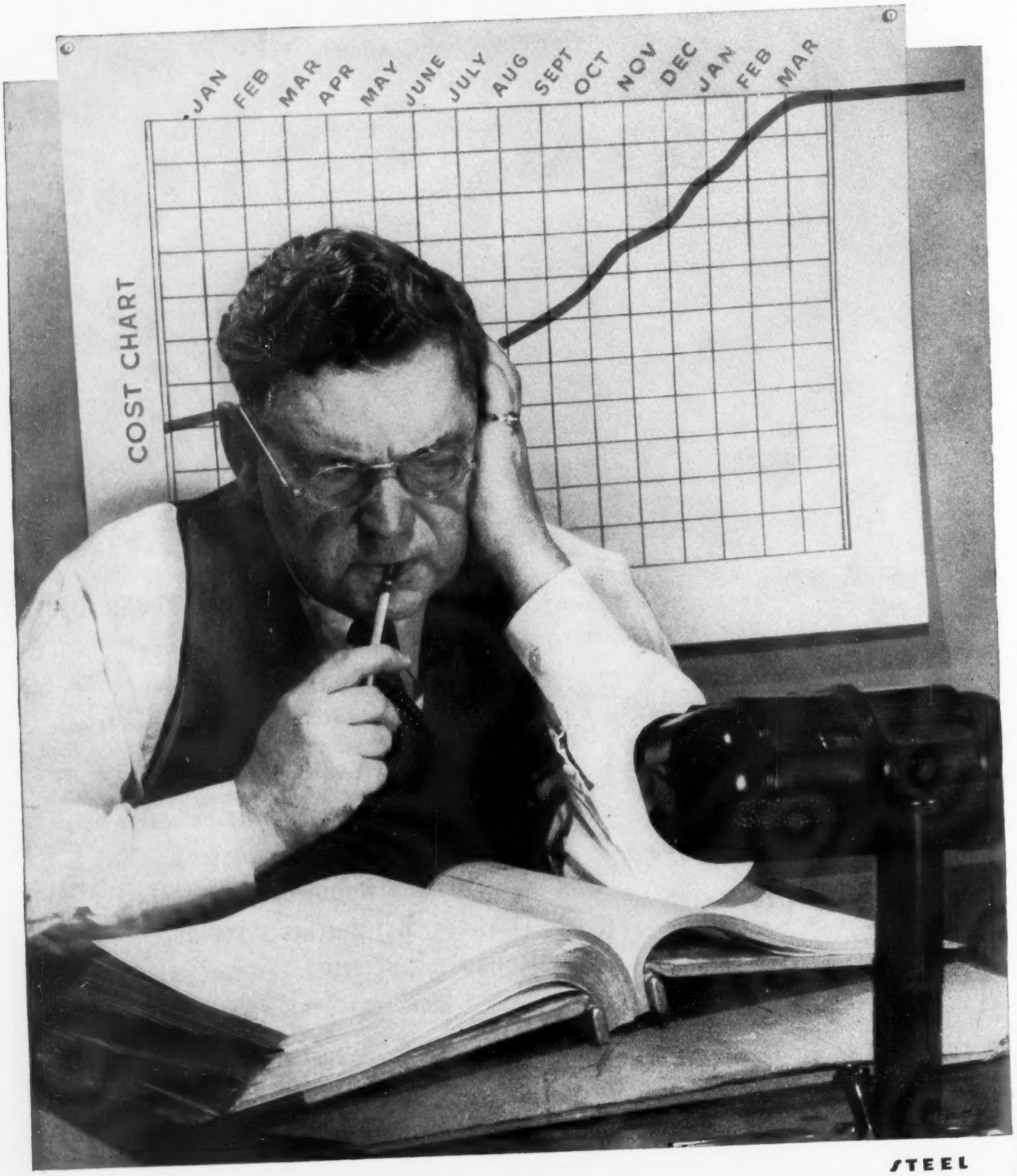
Are your manufacturing



costs *too high?*

BRING THEM IN LINE WITH

AMERSTRIP

TODAY, literally thousands of parts, that formerly had to be forged, machined or cast, can be successfully stamped—at lower cost—from cold rolled steel strip.

Into the last four years we have crowded ten years of peacetime progress. In solving some of the war's toughest manufacturing problems we have discovered ways to use steel strip where it has never been used before. We have helped to develop manufacturing processes that now make it possible to meet with *stamped parts*, tolerance limits usually required for machined parts. And we have learned how to produce strip, in Carbon, Alloy and Stainless Steels, so unfailingly uniform in analysis, gage, size, finish and temper that your high speed production lines, once set up, can be kept flowing without interruption.

This specialized "know how" and the unexcelled facilities of the country's largest manufacturer of cold rolled strip are available to every user of U·S·S AMERSTRIP—not only to improve your peacetime products but to speed up their manufacture and to lower their cost.

Nothing would please us more than to offer immediate delivery of U·S·S AMERSTRIP, but circumstances beyond our control together with a tremendous backlog of orders make this kind of service impossible at present. You can be sure however that we will do everything within our power to take care of your requirements just as soon as conditions permit.

AMERICAN STEEL & WIRE COMPANY

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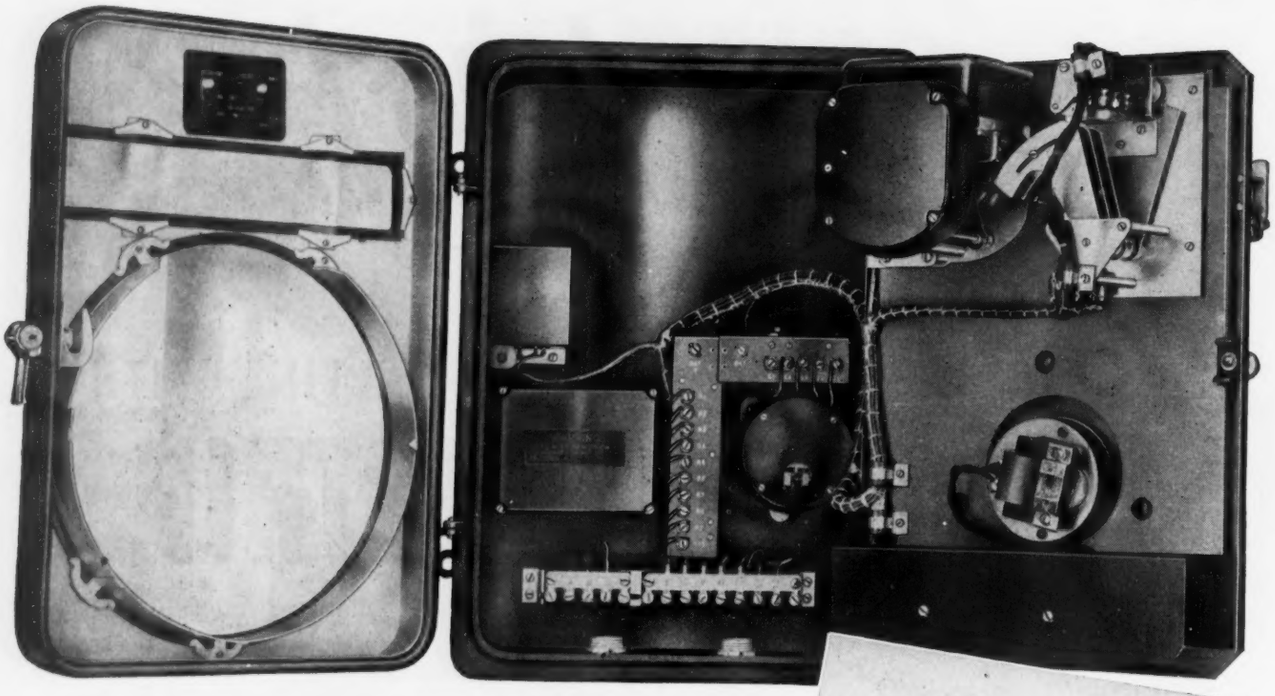
UNITED STATES STEEL

EVERY SUNDAY EVENING, United States Steel presents *The Theatre Guild on the Air*. American Broadcasting Company coast-to-coast network. Consult your newspaper for time and station.

U·S·S AMERSTRIP Cold Rolled Strip

AMERICAN STEEL & WIRE COMPANY · USS · AMERSTRIP COLD ROLLED STRIP · UNITED STATES STEEL



Bristol MICROACT Controller Model 431, Type 30. Note that all parts are accessible even when operating. No lubrication needed. Cold-junction compensator is fully automatic. No mechanical connection between galvanometer and other units, so galvanometer can be protected from dust and air currents when door is open.

There's No Fuel Like a Controlled Fuel

Bristol MICROACT Controllers keep temperature right in oil-or-gas fired equipment

Bristol Pyromaster Controllers — instant response, unaffected by vibration, no mechanical motion except when temperature changes — are offered in models for use with electrically-operated fuel control apparatus...also magnetic switches for electrically-heated equipment.

These MICROACT Controllers have snap-acting precision switches which operate from a rugged, accurately adjusted cam mechanism to open and close the electric circuits of the fuel apparatus with precision control.

The following types are offered:

Low — Open; High — Open; Low — High — controls two load circuits; Low — Open — High — controls two load circuits; Low — Normal — High — controls three load circuits and various combination of these types.

Also offered for Proportioning and Proportional Current-Input Control.

Write for Bulletin PB1226, addressing THE BRISTOL COMPANY, 149 Bristol Road, Waterbury 91, Conn. (The Bristol Co. of Canada Ltd., Toronto, Ont. Bristol's Instrument Co. Ltd., London, N. W. 10, England.)

AUTOMATIC CONTROLLING AND RECORDING INSTRUMENTS

BRISTOL

... Gives YOU the Most from Heat

SUTTON
ENGINEERING COMPANY

Bar Straighteners, Tube Straighteners, Sheet Stretchers, Cold Bar Stretchers, Hot Bar Stretchers, Roller Levellers, Mechanical Hammers, Tube Expanding Machines, Polishing Machines, Shape Straighteners, Sizing Machines, Gag Presses, Automatic Shearing, Straightening and Sizing Units, Reeling Machines, Shell Sizing Machines, Special Straighteners for upset end bars and tubes and Mechanical Descaling Equipment.

Sustained leadership..

IN THE FIELD OF STRAIGHTENING EQUIPMENT

OFFICES—Park Building, Pittsburgh, Pa. • WORKS—Bellefonte, Pa.

Where profits hang by a thread

PLUS OR MINUS 2/10,000"

Photo Courtesy Bulova Watch Co.

HERE'S precision work so delicate that you have to use a magnifying glass to see the detail. The picture above shows the winding stem of a fine watch being turned and threaded to tolerances of 2/10,000 of an inch.

To improve visibility and increase efficiency on this delicate work, the watch-makers recently started using Socony-Vacuum's new *light-colored transparent odorless S/V Sultran Oils*. As a result, these same operators report that they are now able to operate their automatics at higher speeds for greater production.

The anti-weld characteristics of these oils have helped to eliminate seizures in the guide bushings, which formerly slowed up production. Operators say they're getting finer finishes and fewer rejects than with previous oils and their working conditions are more pleasant.

This report is typical of many coming in since the introduction of the new light-colored Sultrans. Ask your Socony-Vacuum Representative for additional details.

Get this Complete Lubrication Program for all your machines

- Lubrication Study of Your Entire Plant
- Recommendations to Improve Lubrication
- Lubrication Schedules and Controls
- Skilled Engineering Counsel
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GARGOYLE Lubricants

Socony-Vacuum Oil Co., Inc.

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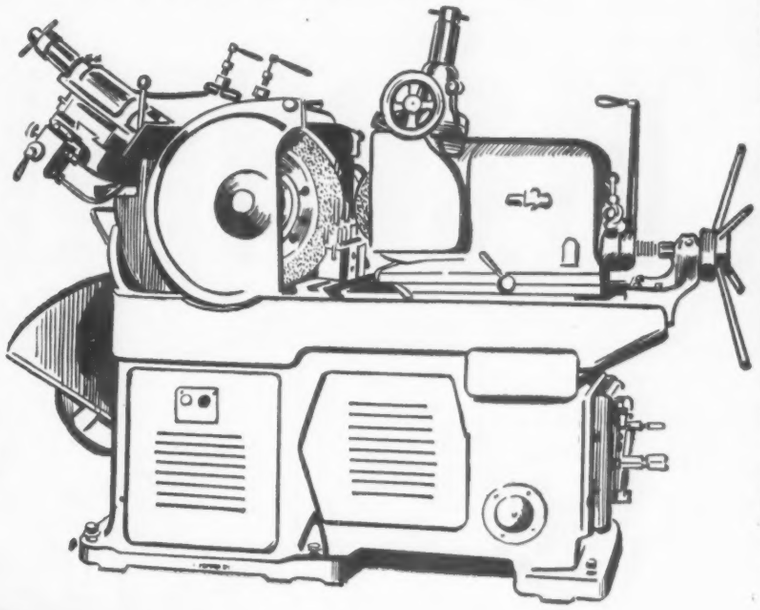
TUNE IN "INFORMATION PLEASE"—MONDAY EVENINGS—9:30 E.D.T.—NBC

GOVERNMENT-OWNED SURPLUS PRODUCTION EQUIPMENT

CINCINNATI CENTERLESS GRINDERS: Model No. 2 located in Detroit, Chicago, Cleveland, Boston, Philadelphia and New York; Model No. 3 located in Detroit, Chicago, Cleveland, and Boston Regional Offices.



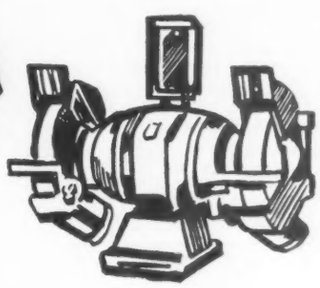
STANDARD MAKES

STANDARD MODELS

CENTERLESS GRINDERS

Do you need additional machine tools for new operations . . . or to speed up old? Thousands of machine tools, like these grinders, are surplus and available to you at low cost. The equipment is modern; much of it unused, some only slightly used. Look today for places to use this equipment. You will be rendering a vitally important service—not only to yourself as a producer and taxpayer—but also to the country as a whole. These tools *must* go to work to produce badly needed peace time products.

BENCH GRINDERS



BROWN-BROCKMEYER: 2-wheel, electric bench grinders in 8" and 10" wheel sizes located in San Antonio Regional Office of War Assets Administration.

VETERANS OF WORLD WAR II

To help you in purchasing surplus property, veterans' units have been established in each War Assets Administration Regional Office.

MAIL TODAY

To War Assets Administration:

Please send me information on the availability of the following types of grinders:

MAKE	MODEL	SIZE	
.....	.....	.....	Centerless grinders
.....	.....	.....	Bench grinders
.....	.....	.....	.....grinders (other)

Name.....

Firm .....

Address.....

City.....State.....

277-3

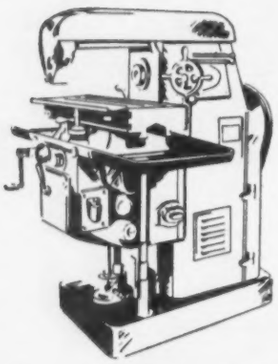
WAR ASSETS ADMINISTRATION

OFFICES LISTED BELOW ARE TEMPORARILY IN RECONSTRUCTION FINANCE CORPORATION AGENCIES

Offices located at: Atlanta · Birmingham · Boston · Charlotte · Chicago · Cleveland · Dallas · Denver Detroit · Helena · Houston · Jacksonvile · Kansas City, Mo. · Little Rock · Los Angeles · Louisville Minneapolis · Nashville · New Orleans · New York · Oklahoma City · Omaha · Philadelphia Portland, Ore. · Richmond · St. Louis · Salt Lake City · San Antonio · San Francisco · Seattle · Spokane Cincinnati · Fort Worth (Telephone 3-5381)

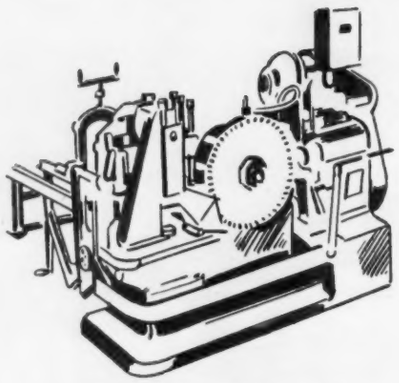
GOVERNMENT OWNED SURPLUS

MACHINE TOOLS



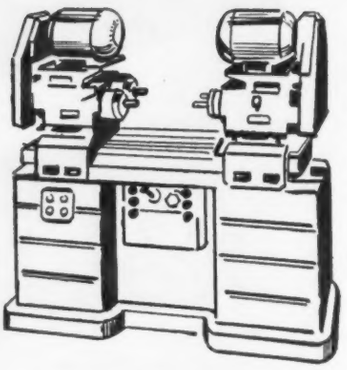
AUTOMATIC BED TYPE MILLING MACHINES

Models 1-12 and 1-18, located in New York, Detroit, Cleveland, Chicago, and Boston Regional Offices.



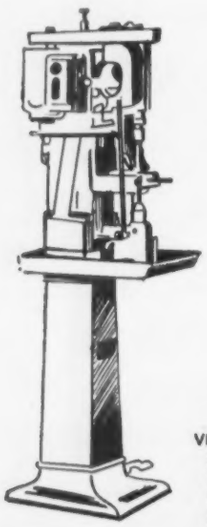
COLD SAWING MACHINES, CIRCULAR

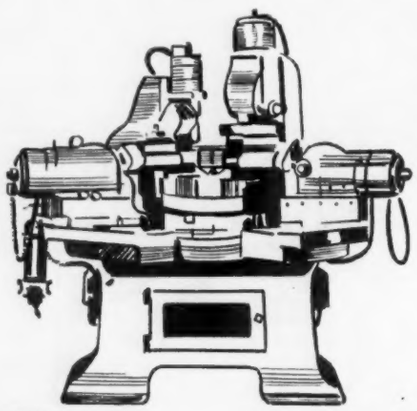
1½" to 21" capacity, in standard models of well known makes, located in Detroit, Chicago, Cleveland, Philadelphia, Boston Regional Offices.



PRECISION BORING MACHINES

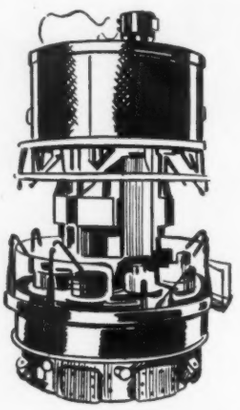
Both single and double end types located in Detroit, Chicago, Boston, Cleveland, Minneapolis, Kansas City and, in lesser quantities, other Regional Offices.





VERTICAL & HORIZONTAL DRILLING MACHINES

Special Kingsbury type machines located in Boston, Chicago, Detroit, Philadelphia, Richmond, St. Louis and, in limited quantities, other Regional Offices.



LATHE, MULTIPLE SPINDLE, AUTOMATIC VERTICAL CHUCKING

Largest inventories located in Boston, Chicago, Cleveland, Detroit, New York and Philadelphia.

WAR ASSETS ADMINISTRATION

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PRODUCTION EQUIPMENT

NOW!

MODERN MACHINES . . . MANY MODELS . . . STANDARD MAKES

These machine tools *must* go to work. You need the profits. America needs the production. Taxpayers need maximum recovery to the government of their original cost. On hand, at every War Assets Administration office in the U. S. there are hundreds of these machines. Nearly every category of modern production equipment can be obtained at low cost. You have a unique opportunity to initiate new enterprises or modernize old . . . and at the same time do your country an important service. Check this partial list over carefully for equipment you can use. Then write, wire, or phone your nearest War Assets Administration office for detailed information, or if you prefer mail the coupon.

CHECK LIST OF SPECIAL MACHINE TOOL BUYS!

Here are a few of the many thousands of machine tools available through War Assets Administration.

MACHINE (Function)	TYPE	SIZE OR CAPACITY	Quantity Available Now
Boring, Drilling & Milling	Horizontal	Under 3" to 6"	209
Boring & Turning Drills	Vertical	Under 36" to 120" Swing	683
Boring Fixed Rail Tank Mill	Vertical		87
Precision Boring Machines	Horizontal bridge—single end	Under 8" to 14"	486
	Horizontal bridge—double end	Under 8" to 14"	226
Drills	Box column—single spindle	Under ½" Cap.	
		Up to 22" Swing	287
		½" to 1" Cap.	
		16" to 24" Swing	187
	Round column—single spindle	Under ½" Cap.	
		Up to 22" Swing	738
		½" to 1" Cap.	
		16" to 24" Swing	1163
	Sensitive Floor & Pedestal Box column	Under ½" Cap.	
		12" to 22" Swing	933
		½" to 1" Cap.	
		16" to Over 24" Swing	1875
		1" Cap. and over	
		24" Swing and over	434
	Sensitive Floor & Pedestal Round column	Under ½" Cap.	
		12" to 22" Swing	384
		½" to 1" Cap.	
		Under 16" to 24" Swing	1131
Drills	Sensitive Floor & Pedestal Upright Type—Box column	Up to 28" Swing	54
	Sensitive Floor & Pedestal Upright Type—Round column	Up to 28" Swing	16
	Heavy Manufacturing Type	Up to 32" Swing	25
	Spec. Kingsbury Way & Vertical		25
Gear Hobber	Horizontal	4" to 16" Cap.	32
	Vertical—Universal	Under 16" Diameter	8
Gear Shapers	External & Internal	Up to 40" Diam.	28
	Spur—External only		15
	Spur & Helical—External & Internal	Up to 25" Diam.	27
	Spur & Helical—External only		15
Gear Cutters	Bevel Type not incl. Plainer Type Str. Bevel	Up to 36" Diam.	37
Gear Tooth Finisher	Generating Type Grinding		14
	Formed Wheel Type		19
Gear Tooth Lapper	External only		8
	Comb. External & Internal		5
Gear Tooth Shaver	Rotary Type		13
Grinder	External Cylinder—Plain	Up to 20" Swing	1730
	External Cylinder—Universal	Up to 16" Swing	347
	Centerless—Internal and External	All sizes	607
	Cam		223
	Crank Pin		83
	Valve		245
	Internal Cylinder—Mechanical Feed	All sizes	320
	Internal Cylinder—Hydraulic Feed	Up to 42" Swing	1094
	Internal Cylinder—	Under 12" Swing	151
	Internal Cylinder—Auto. Six. Comb. Hole & Face	16" Swing and over	127
	Internal Cylinder—Auto. Six. Planetary Type	Under 16" Diam.	39
	Internal Cylinder—Auto. Six. Centerless	Up to 28" Diam.	146
	Surface—Horiz. Spindle Rotary Table	All size table diam.	274
	Surface—Vertical Single Spdl. Rotary Table	12" to 48" Table Diam.	157
	Surface—Reciprocating Horiz. Spindle—Hand Feed	12" length work cap. and over	146
	Surface—Reciprocating Horiz. Spindle—Power Feed	Under 18" to 120" length work cap.	840
	Thread—External only	All sizes	635
	Thread—External & Internal	8" Cap. and over	82
	Tool & Cutters—Universal	All sizes	691
	Drill	All sizes	348
	Single Point Tool	All sizes	458
	Bench—Double End	All sizes	2876
	Bench—Single End	Up to 8" Wheel diam.	1105
	Floor—Double End—Dry	Up to 24" Wheel diam.	831
	Floor Comb.—Wet & Dry	10" to 16" Wheel diam.	216
	Bench Floor & Snag—Swing Frame		155
	Comb. Grinder & Buffer		1805

EXPEDITING FREE! COUPON

Use this coupon to conserve your time. Print in a brief description of the make, type, model, and size of machine in which you are interested. We will determine *in advance* our stock situation on the machines and inform you quickly. No obligation, of course.

To War Assets Administration: Do you have in surplus stocks the following machine tools? Where are they located? What is their condition?

Type.....Make.....Model.....Size.....

....

....

Name.....Tel. No.....

Title.....

Firm.....

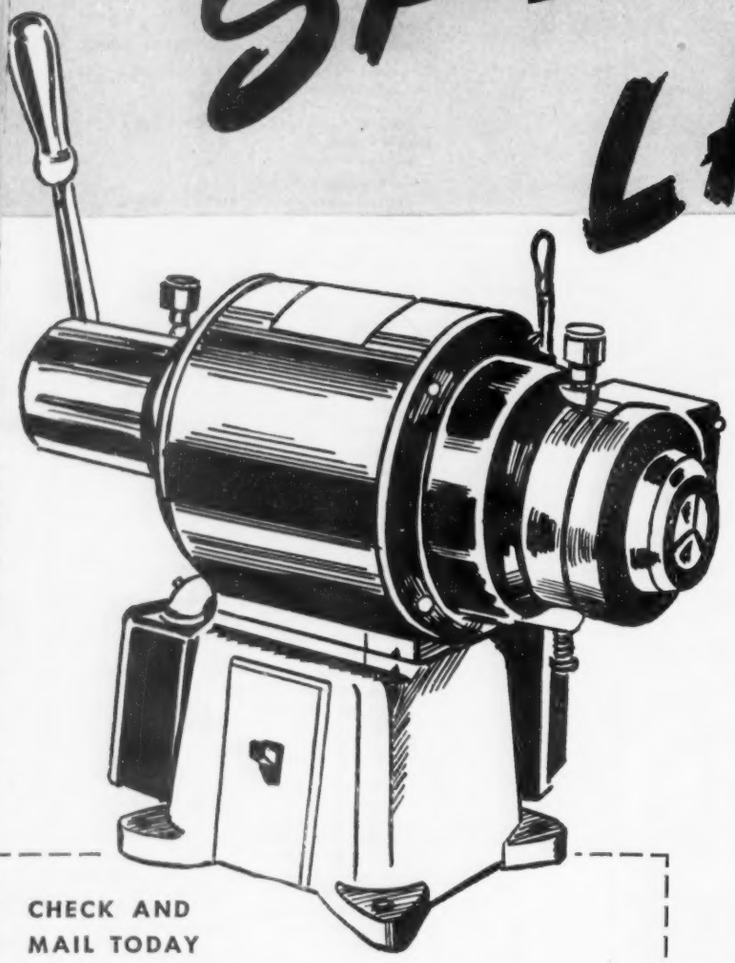
Address.....

City.....State.....

277-3

GOVERNMENT-OWNED
SURPLUS PRODUCTION
EQUIPMENT

SPEED LATHES



1/6 TO 5 H.P. STANDARD MAKES AT LOW COST

Speed Lathes like this are just one of dozens of kinds of modern machine tools now available from government surpluses. For instance look at the equipment shown on the three preceding pages. Of *immediate* machine tool needs, there is scarcely one which cannot be met quickly, and at low cost, from War Assets Administration stocks—and additional equipment is being declared surplus regularly. One of industries' and government's major post war tasks is to put this equipment to productive use quickly. More specifically—where can *you* use one or more of these speed lathes profitably? Find out today and contact any War Assets Administration Office.

WHERE SPEED LATHES ARE!

W.A.A. Regional Office	½ HP—	½ to 1 HP	1 to 3 HP	3 HP+
Detroit	204	231	147	22
Chicago	97	86	87	65
Boston	33	89	.....	.....
Cleveland	57	32	19	.....
New York	6	.....	3	.....
Denver	11	60	.....	.....
St. Louis	155	.....	26	.....
Minneapolis	67	14	6	.....
Spokane	3	11	.....	.....

CHECK AND MAIL TODAY

To War Assets Administration:
Without obligation, please send me the following information on lathes:

	MAKE	MODEL	SIZE
Speed Lathes ☐	.....	.....	.....
Multi-cut Lathes ☐	.....	.....	.....
Other types ☐	.....	.....	.....

Name.....

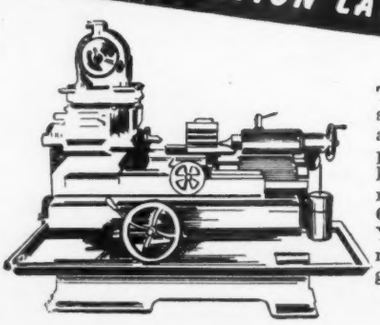
Firm.....

Address.....

City.....State.....

277-3

SMALL PIECE MULTI-CUT PRODUCTION LATHES



These Reid lathes may be stripped and retooled for any special kind of small production work. Machines located principally in Birmingham, Boston, Chicago, Cleveland, Detroit, New York, Philadelphia, Richmond and St. Louis Regional Offices.

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it's better iron from HANNA

For more than 75 years, Hanna Furnace has worked to provide foundrymen with better iron for better castings. Hanna Furnace is quality-minded . . . has always been willing to experiment and cooperate in the development of new ideas that lead to *more uniform* and *higher quality* castings . . . has made continuous progress in controlling crystal growth to insure finer grain structure, thus contributing to the *strength* of finished castings.

Whether you use the new 10-pound Hanna Ten ingot or the conventional 40-pound pig, you can be sure of best results with Hanna iron. A Hanna metallurgist will be glad to point out the specific advantages of both forms of Hanna iron. Just write or phone your nearest Hanna office.

THE HANNA FURNACE CORPORATION

BUFFALO • DETROIT • NEW YORK • PHILADELPHIA • BOSTON

MERCHANT PIG IRON DIVISION OF NATIONAL STEEL CORPORATION

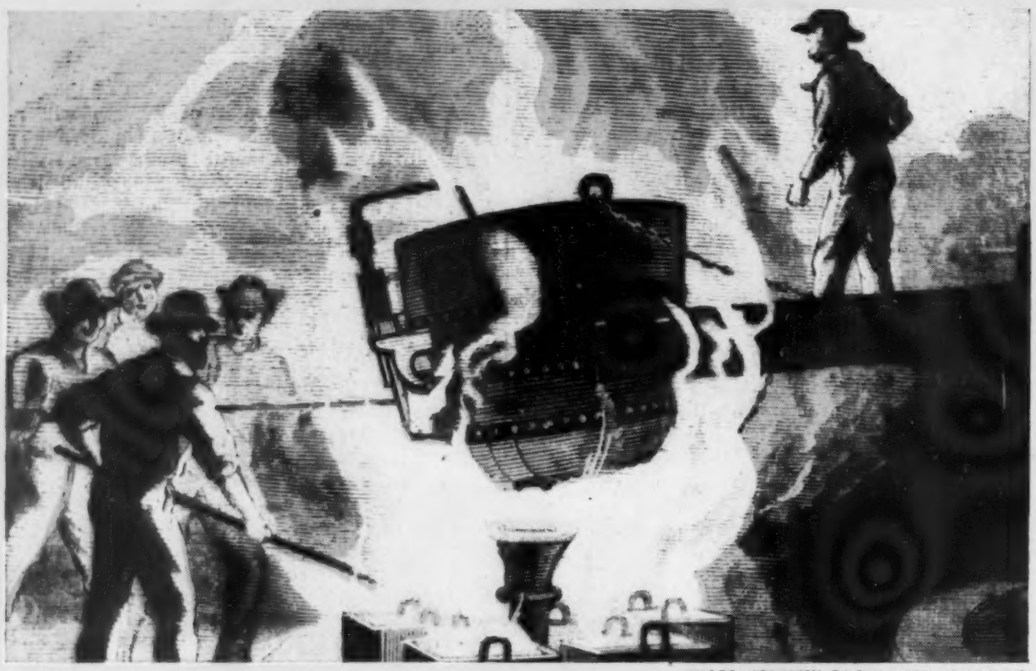


PHOTO COURTESY OF THE BETTMAN ARCHIVE

FROM A METAL MAKER'S "FAMILY ALBUM"

WHEN OPEN HEARTH STEEL WAS AN INNOVATION—

"Standard" Was Doing Business at its Present Stand

This picture, drawn in 1876, shows a busy time at the pouring pits. It's possible that the metal came from one of the early open hearth furnaces, for they had recently been introduced in America.

Always a pioneer, Standard Steel quickly recognized the commercial advantage of the new steel, discontinued the operation of its crucible plant, and began to manufacture tires from open hearth steel.

Today Standard's foundry has an annual capacity of 20,000 tons, a forge shop capacity of 15,000 tons of locomotive forgings, plus 30,000 tons of heavier miscellaneous forgings.

You'll find complete facilities to handle all classes of your work promptly and accurately at Standard. To simplify your buying why not "Standardize on Standard."

BLW THE BALDWIN GROUP

BALDWIN

FORGINGS AND CASTINGS

The Baldwin Locomotive Works, Standard Steel Works Division, Burnham, Pa., U.S.A. Offices: Philadelphia, New York, Chicago, St. Louis, Washington, Boston, San Francisco, Cleveland, Detroit, Pittsburgh, Houston, Birmingham, Norfolk.

"STANDARDIZE ON STANDARD" FOR YOUR FORGINGS AND CASTINGS

Remove bar seams faster ... at less cos

By eliminating much of the costly, old-fashioned chip-hammer method of seam removal, the Betts Bar Peeling Machine speeds up production and lowers bar peeling cost. The bar is fed into the cutter head, a light peeling cut taken, and the peeled bar ejected, at cost-saving speed. As most seams or imperfections are on the surface, this light cut removes most of them, and exposes the few remaining for chipping. The economy possibilities of this machine are well worth your investigation.

BETTS BAR PEELING MACHIN

Complete information will be furnished upon request

Among Heavy Machine Tools built by Consolidated are . . .

LATHES
BORING MILLS
DRILL PRESSES
MILLING MACHINES
BORING MACHINES
PLANERS
SLOTTERS
RAILROAD SHOP TOOLS
AUTOMOTIVE TOOLS
AND OTHER
SPECIAL MACHINES

BUILDERS OF HEAVY DUTY MACHINE TOOLS SINCE 1861

BETTS • BETTS-BRIDGEFORD • NEWTON • COLBURN • HILLES & JONES • MODERN

CONSOLIDATED MACHINE TOOLS

CONSOLIDATED
MACHINE TOOL CORPORATION

ROCHESTER 10, NEW YORK

No Flaking - No Chipping - No Peeling

when you use Anti-Corrosive IRIDITE as a Paint Base

Tests by several leading companies show that IRIDITE provides a firm base for paint and clear lacquer . . . as well as a corrosion-licking, protective finish . . . on zinc die cast, zinc plated, galvanized and cadmium plated products. IRIDITE keeps the zinc from fouling the paint . . . prevents formation of the soapy, chalky underlying film that destroys adhesion. IRIDITED products take paint readily . . . hold it permanently . . . without flaking, chipping or peeling!

LICKS CORROSION, TOO!

Moreover, IRIDITE is widely used as a final protective finish . . . on zinc, cadmium, galvanizing. A quick IRIDITE dip balks corrosion while adding eye-appeal to your products . . . since it is available in black, blue, green, red, bronze, olive drab and transparent IRIDITE bright. And to cut costs, use IRIDITE in combination with zinc plating to replace more expensive materials.

FAST APPLICATION!

Whether you use IRIDITE as a paint base or as a anti-corrosion finish . . . it's easy to apply. Simply immerse your product in an IRIDITE solution . . . manually or automatically . . . on racks or in bulk . . . for 15 to 60 seconds . . . at normal shop temperatures. Your products keep moving along at automatic production line speed . . . and they are dried in a few seconds for immediate painting or handling.

Test IRIDITE as a paint base in your own plant, under your own conditions. Check it as a final protective finish with our FREE TEST PANEL . . . half IRIDITED, half unprotected. Send for your panel today. Rheem Research Products, Inc., 105 Chemical Building, 4004 E. Monument Street, Baltimore 5, Md.

IRIDITE TEST-imonials

"We have nothing but satisfactory reports on the parts that were Iridite treated on our two body valves."

EDWARD B. LOCKWOOD, *Vice President*
Streamaster Shower Corporation
New York, N. Y.

See how IRIDITE fits into your production. Send for FREE TEST PANEL . . . and subject it to the same corroding conditions your products must meet. Write today.

BRANCHES: 570 Lexington Ave., New York 22; 2411 Sichel St., Los Angeles 31. Distribution in: Waterbury; Detroit; Los Angeles; Minneapolis.

RHEEM RESEARCH PRODUCTS, INC.
IRIDITE
4004 E. Monument St., Baltimore 5, Md.

Reg. U. S. Pat. Off.

MORE STARTS FOR THE 1946 STUDEBAKER

G-E electronic heater adds life . . . cuts production time of automobile starter ring gears

G-E 50 kw electronic heater, used at Studebaker's South Bend plant

HEAT-TREATING time has been reduced and the gears have been tested to withstand four times the number of starts expected in the normal life of the car.

It used to take 2½ hours to heat and temper these gears—now it can be done in 20 seconds, and the entire process is completed in the machining department—in proper manufacturing sequence.

Induction hardening, with the electronic heater, is eliminating costly, time-consuming operations in many plants. Since only the teeth are hardened and then quenched in a matter of seconds, distortion is reduced to a minimum.

The General Electric Company is anxious to give you the benefit of more than 20 years experience in industrial heating. Brazing, soldering, annealing, hardening—let our heating specialists give you an unbiased recommendation on the best type of heating equipment for your job. As manufacturers of furnaces as well as electronic heaters, G.E. can supply the equipment best-suited to your needs. *General Electric Company, Schenectady 5, N. Y.*

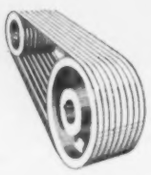
GENERAL ELECTRIC

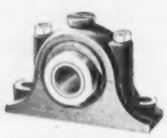
675-132-8708

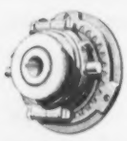
TRANSMISSIONEER...

WHO'S HE?

He's a graduate of a Dodge factory course, qualified by intensive training and a broad practical experience to give you the latest answers to problems in efficient mechanical transmission of power—in your plant or as applied to your product.







The Transmissioneer is backed by a broad line of Dodge bearings, sheaves, pulleys, clutches and other drive components. He is qualified by training and experience to select elements which make *the right drive for the job.*

Typical of the engineering advancement which marks Dodge products is the new Taperlock sheave, which has the simplest, surest mechanism ever devised for fastening wheels to shafts. For information about Taperlock—and other new developments in the mechanical transmission of power, call the Transmissioneer — your local Dodge distributor. Most power drive requirements can be supplied direct from the distributor's stock.

Look in the classified telephone directory under "Power Transmission Equipment" for your Transmissioneer's name and number. Call him for advice—without obligation.

DODGE MANUFACTURING CORPORATION, MISHAWAKA, INDIANA

To obtain his diploma every Transmissioneer must pass an intensive course of training at the Dodge factory. Lectures, classroom work and practical demonstrations of power transmission problems make up the course.

DODGE
MISHAWAKA

THE SYMBOL THAT CAME TO LIFE

257 factory graduate Transmissioneers wear this sign of a nation-wide personal service that helps you put all your power into the job.

Copyright, 1948, Dodge Mfg. Corp.

NAME PLATES

FOR YOUR NAME PLATE REQUIREMENTS, WRITE OUR SUBSIDIARY, ETCHING COMPANY OF AMERICA, 1520 MONTANA STREET, CHICAGO 14, ILLINOIS

Scovill NON-FERROUS FORGINGS

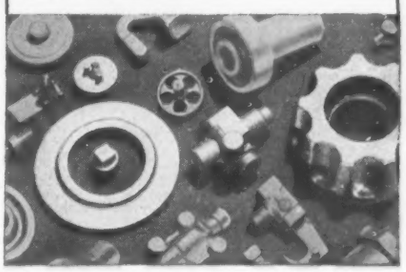
When SCOVILL becomes your METAL-PARTner QUALITY GOES UP, COSTS STAY DOWN ON CHROME-PLATED PARTS like these.

BEFORE SCOVILL: This base part of a surgical instrument was formerly made from sand castings. Grinding and buffing costs ran high and defects uncovered by these finishing operations caused about 10% rejections. Complaints about the inability of the chrome plating to stand up under repeated sterilization were serious.

SCOVILL *Masters of Metal*

AFTER SCOVILL: With Scovill forgings, the customer saves approximately 6¢ per piece in finishing costs alone, reduces rejects to zero. And because the dense structure that results from forging permits better chrome plating, the customer has an improved product at lower cost.

TALK IT OVER WITH SCOVILL. Maybe your brass, aluminum or other non-ferrous metal parts can be improved in quality or lowered in cost by a similar change to another method or design. Our long forging experience may be of value to you. Investigate whether you, too, can benefit from making Scovill *your* METAL-PART*ner*. Fill in the coupon and mail it today. Scovill Manufacturing Company, Waterbury 91, Conn. *Export Department:* 405 Lexington Ave., New York 17, New York.



Please send me information about your metal-working facilities. I am interested in non-ferrous forgings for the applications checked:

- ☐ Aircraft
- ☐ Automobiles
- ☐ Band Instruments
- ☐ Blow Torches
- ☐ Cameras
- ☐ Communication Equipment
- ☐ Compressed Gas Cylinders
- ☐ Fire Extinguishers
- ☐ Household Appliances
- ☐ Industrial Instruments
- ☐ Plumbing Goods
- ☐ Pumps
- ☐ Valves
- ☐ Welding Equipment

Other applications.....

.....

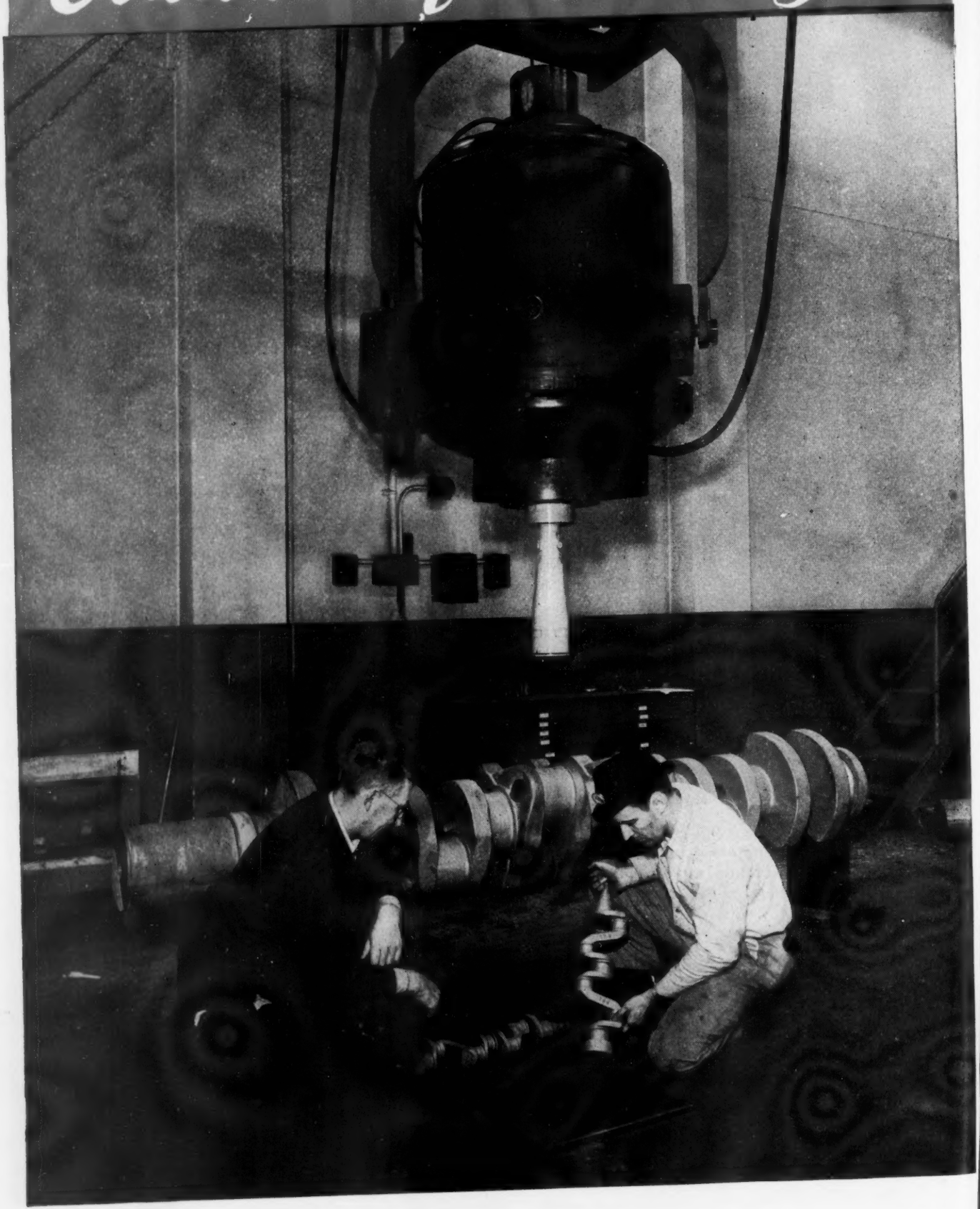
SCOVILL MANUFACTURING COMPANY
Forgings Division
20 Mill Street
Waterbury 91, Connecticut

Name .....

Company .....

Address .....

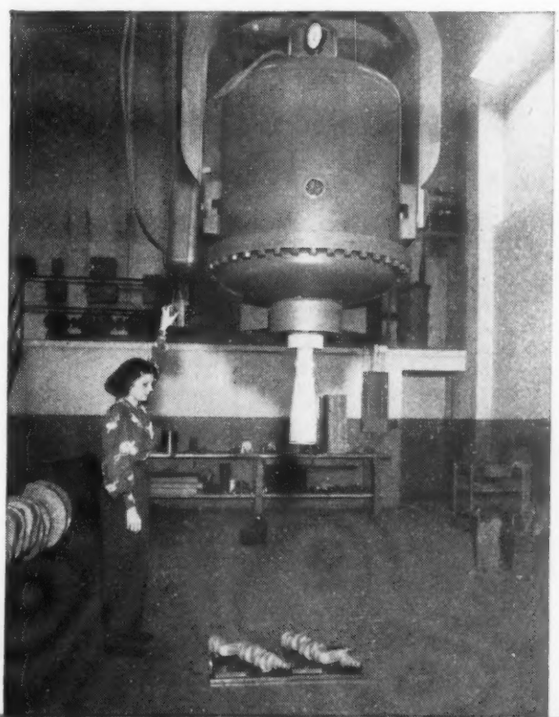
Crankshaft Casting—



X-RAY DEVELOPED AND CONTROLLED

In massive diesel locomotives, marine engines —and countless smaller motors—crankshafts cast in the huge C. W. & C. Crankshaft Corp., subsidiary of Campbell, Wyant and Cannon Foundry Company, are proving they can take it. Their stamina, as is that of all C. W. & C. castings, is pre-determined by G-E 1,000,000-volt X-Ray inspection.

Exemplifying the procedure employed in all cases is the development of one crankshaft casting, produced in large quantities for a major manufacturer of motors. Shrink revealed in the first pilot casting radiograph suggested several pattern revisions that resulted in marked improvements. Further changes in the method of pouring then produced a flaw-free pilot casting for production runs. Continued intervaled x-ray inspection assures controlled quality.



Angulation of the G-E 1,000,000-volt Industrial X-Ray Unit is finger-tip controlled—one of many features contributing to its ease of operation.

Under close x-ray inspection, of the first 1,841 shafts cast approximately 40% were foundry scrapped. Of the remaining 1,100 only 15 pieces were rejected by the machine shop! With soundness assured x-ray inspection was relaxed —6,292 shafts were shipped in the 6 months following, with only 8% shop rejection and 9% machine shop scrap!

Thus x-ray has proved the answer to another problem—just as it can to yours. There's a time, material, and money-saving G-E Industrial X-Ray Unit to meet every requirement—available in a full range of power up to and inclucing 2,000,000 volts. For full information about the many G-E X-Ray features—or the services of experienced G-E X-Ray Engineers in applying x-ray to your inspection, design, and production problems—act today, write or wire General Electric X-Ray Corporation, Department N33.

GENERAL ELECTRIC
X-RAY CORPORATION
2012 JACKSON BLVD. CHICAGO (12), ILL., U. S. A.

IF you regard WALLACE BARNES as a large-scale spring production plant only, mark well this fact:

No spring order is ever considered too small for our attention. Separate departments are maintained for just this purpose—samples, small orders, emergency service—overnight delivery if needed.

We aim to provide spring production in whatever degree you need. Say the word, and let performance be the measure.

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SMALL STAMPINGS
WIRE FORMS

SPRING STEEL

Barnes-made springs

Engineered Pep and Power

WALLACE BARNES COMPANY Bristol Connecticut
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Advertisement

CLEANING AND CORROSION TIPS

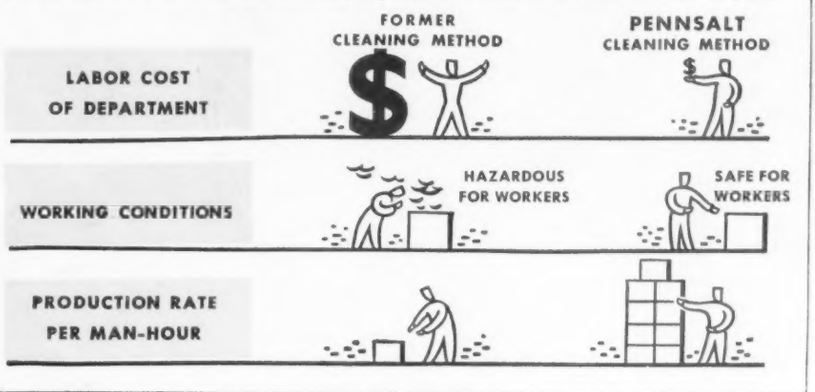
Issue No. 2

June 1946

CASE NO. 677

Production Results Like This Build Prestige With Front-Office Management

There is only one solution to the problem of higher labor costs as far as successful industrial operations are concerned. That is greater efficiency in production. The chart below represents the increased production efficiency attained by the cleaning superintendent of a large nationally-known metal-working company. Working together with a Pennsalt man, experienced in processes for *better, faster* metal cleaning at *lower* costs, he has made a record for his cleaning department which is the talk of his company.



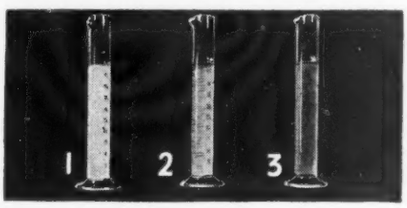
CASE NO. 607

Pre-Cleaning Time Cut from 5 Minutes to 30 Seconds

An X-ray equipment manufacturer demanded of his department heads faster, lower-cost production all along the line in order to meet tough competition. The cleaning foreman called in a Pennsalt man. First, the pre-cleaning operation was tackled. Tests were run with Pennsalt Cleaner EC-10. The brass, copper and steel parts, covered with buffing compounds, oils and greases started "coming clean" in a matter of seconds instead of minutes required by the former method.

Next the electrolytic cleaning step in the cycle was redesigned, using another type Pennsalt Cleaner. Similar gains in production speed, hence sharply lower costs, resulted.

Pennsalt EC-10 is a new emulsion-type cleaner. One example of its outstanding superiority is pictured below.



These graduates show comparison of three solvent emulsion cleaners, diluted 1:50 with water. After standing forty-eight hours No. 1 (Pennsalt Cleaner EC-10) shows a thick dense emulsion, while No. 2 and No. 3 show considerable separation. This test demonstrates the high degree of stability of Pennsalt Cleaner EC-10 in water emulsion.

CASE NO. 630

500,000 Lbs. Acid Saving

Large tonnages of alloy and various carbon steels were being pickled in a large Western steel mill, the acid consumption running about 1,500,000 pounds annually. After studying conditions in the plant, the production rate and the quality of cleaned metal surface desired, an acid inhibitor (Pennsalt PM-40) was recommended by the Pennsalt man. This product has unusual characteristics in protecting the base metal so that the useful life of the acid is prolonged. Tests with Pennsalt PM-40 proved that the pickle would run for 10 days whereas it had been customary previously to dump the acid every other day. Based on anticipated steel production, this plant will save about 500,000 pounds of acid per year, not to mention the previous every-other-day labor cost involved in dumping the spent acid.

CASE NO. 651

Heat Treater Hold-Up Eliminated

A bottle neck existed in the cleaning operation of a well-known electrical equipment manufacturer. The heat treaters were not getting cleaned parts fast enough. The cleaning foreman was being blamed. What to do? Additional manpower and new cleaning equipment were not available. Working side by side in his shirt sleeves with the men in the cleaning gang, a Pennsalt man studied every step in the cleaning cycle. Recommendations were made which incorporated a new high-speed Pennsalt Cleaner in the cycle. The cleaning speed stepped up 400% and dovetailed perfectly with the production needs of the heat treaters. No additional labor was required in the cleaning operation and down-time in the heat treating department was eliminated.

THE LAB NOTEBOOK

Corrosion-proof brick construction is often specified for equipment designed to handle acids, alkalies, and solvents, but the choice of the proper cement has heretofore presented a difficult problem. Like the weakest link in a chain, the service that can be expected of such construction is dependent upon the cement used as the bonding material.

Pennsalt PRF Cement, a new resin product, is furnished as two ingredients which when mixed together form a cold-hardening chemical-setting mortar. Bonding tightly to all ceramicware, this product is liquid impervious, highly resistant to abrasion, and resistant in use to the majority of commonly encountered *acids, alkalies* and *solvents*. Pennsalt PRF Cement, installed five years ago in a plant test under the most severe corrosive conditions, is still in excellent condition despite continuous attack.

CASE NO. 676

A General Superintendent Writes—

"Formerly we used two different metal cleaners, one for cleaning parts to be enameled, the other to clean those to be plated. Now we do both jobs better with one Pennsalt Cleaner . . . and on top of that, it has saved us 28% in cleaner costs."

Since every plant has its own cleaning problems, a great number of Pennsalt Cleaners . . . developed for varied and extreme requirements . . . are available. All have exceptional dissolving and emulsifying action, long lasting power and quick cleaning ability.

CASE NO. 692

Aluminum Cleaning Cost Cut from $550 to $250 per Month

There was trouble on two fronts for this maker of aluminum motor parts. Oil and aluminum chips still remained after the cleaning cycle. Equally serious, worker efficiency was reduced because of the offensive odors from the cleaning solution. When the Pennsalt man with his advanced metal-cleaning experience called, he was asked to analyze the operations and make recommendations. A Pennsalt Cleaner was suggested, no changes being made in the type of equipment to be used. Both troubles were eliminated. Far better than the manufacturer had hoped for . . . cleaner compound costs were cut from $550 to $250 per month.

If you would like to see the Pennsalt man, write to Dept. S-5. If your problem is urgent—wire, and he will call immediately.

PENNSALT

PENNSYLVANIA SALT MANUFACTURING COMPANY

Chemicals

Special Chemicals Division

1000 WIDENER BUILDING, PHILADELPHIA 7, PA.

NEW YORK • CHICAGO • ST. LOUIS • PITTSBURGH

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THOUSANDS IN USE TODAY

Wells No. 8

Maybe it's a good idea for you, too-

SPECIFICATIONS:
WELLS No. 8

CAPACITY: . . Rectangular 8" x 16"
(Special Guides) . . . 5" x 24"
ROUNDS: . . . . . 8" diameter
MOTOR: . . ½ H. P., A. C. or D. C.
SPEEDS:
Selective 60, 90, 130 feet per minute
WEIGHT: . Approximately 750 pounds

THE many users indicate—that this Wells No. 8 is the practical, efficient tool that solves metal-cutting problems. A Wells will cut most any shape, size or type metal you can get into the machine. Efficient, it cuts close, removes a minimum of stock. It's easy to use, too. Because it's portable, you can save time and labor by moving the saw to the work. Use this Wells No. 8 to free large production units for other work. It's ruggedly built, simply designed—keeps right on cutting year in and year out. Satisfied users in every branch of the metals industry are your assurance . . . that you can't go wrong by finding that you, too . . . have a spot in your plant for a Wells No. 8.

Wells SAWS
THE SIGN OF SERVICE

Wells

Products by Wells are Practical

METAL CUTTING BAND SAWS

WELLS MANUFACTURING CORPORATION
1515 FILLMORE ST., THREE RIVERS, MICHIGAN

VANCORAM FERRO SILICON

FOR HIGHER QUALITY . . . CLEANER STEELS

Exacting requirements imposed by consumers of steel make it necessary for the steel maker to use the purest ferro alloys available. That is why Vancoram Brand Ferro Silicon has found favor and extensive application in the production of higher grade, cleaner steels and irons that combine maximum physical properties with soundness and freedom from defects.

The uniform size, density and analysis of Vancoram Brand Ferro Silicon insure greater efficiency and economy and consequent improvement in product quality. To cover the varied uses of Ferro Silicon—as a deoxidizer and scavenger, and in the production of silicon-bearing steels and irons—we supply the following grades:

25 to 30% Ferro Silicon
SILICON....25 to 30%

50% Ferro Silicon
SILICON....47 to 52%

75% Ferro Silicon
SILICON....74 to 79%

80 to 85% Ferro Silicon
SILICON... 80 to 84.9%

85 to 90% Ferro Silicon
SILICON... 85 to 89.9%

90 to 95% Ferro Silicon
SILICON..... 90 to 95%

MAKERS OF VANCORAM FERRO ALLOYS AND METALS

The above products are available from stock in lumps or crushed or ground to any required size. Our metallurgists will cooperate with you in the use of Vancoram Ferro Silicon for best results in the carbon and alloy steels you supply.

VANADIUM CORPORATION OF AMERICA

420 LEXINGTON AVENUE, NEW YORK 17, N. Y. • DETROIT • CHICAGO • CLEVELAND • PITTSBURGH

to select the BEARINGS

For the Engineer

A handy file folder containing a wealth of valuable data on Sleeve Type Bearings. Write for your FREE copy.

● The world is waiting anxiously for the new products of American genius. Much has been written about the new materials . . . new methods of manufacturing . . . new finishes that are now available. Never before has the designer had such a golden opportunity to break with the past and to strike out for the future. If the new product contains a motive unit, great care should be exercised in selecting the CORRECT bearings. The RIGHT time to decide what bearing will deliver the greatest performance . . . for the longest time . . . at the lowest cost is *before* production has started. The easiest way to determine this is to call in a Johnson Bronze Engineer. Permit him to review the application . . . to make a recommendation based on facts . . . free from prejudice. Remember, only Johnson Bronze makes EVERY TYPE of Sleeve Bearing. We are ready to serve you NOW!

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ST. LOUIS . . . . SEATTLE

"With GULF LASUPAR CUTTING OIL we get more production, longer tool life"

says this Foreman

Actual photo of a machine shop Foreman consulting with a Gulf Service Engineer on results with Gulf Lasupar Cutting Oil in machining gear blanks for machine tools.

"GULF LASUPAR CUTTING OIL has proved superior to all other cutting oils we have tried for machining gear blanks," says this Foreman. "With this quality cutting oil, we get greater production and much longer tool life than with the cutting fluid we formerly used."

Here's a cutting oil that can help your machines gain an edge in performance—mighty important for the period of keen competition just ahead! Gulf Lasupar Cutting Oil has the combination of characteristics needed to handle the modern steels. It works well at speeds once thought impossibly high. It cuts machining costs — often improves production as much as 50 per cent, and meets requirements for an exceptionally fine finish on the work.

Call in a Gulf Service Engineer today and let him demonstrate how this cutting oil can help you improve your machining practice. Gulf Lasupar Cutting Oil—and the other quality cutting oils in Gulf's complete line—are available to you through 1200 warehouses in 30 states from Maine to New Mexico. Write or wire your nearest Gulf office.

GULF INDUSTRIAL LUBRICATION

Gulf Oil Corporation • Gulf Refining Company

Division Sales Offices:

Boston • New York • Philadelphia • Pittsburgh • Atlanta
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"PERFECT BALANCE" ROTARY BRUSHES

Carefully controlled distribution of the brushing stock gives perfect balance and maximum efficiency to these power driven rotary brushes. Wire or fiber. May be used as individual sections or in assemblies.

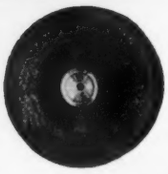
INDUSTRIAL BRUSHES OF ALL TYPES FOR BETTER PRODUCTION

SPIRAL WOUND

These brushes are made with various fills, such as nickel-silver wire, tampico or horsehair — each engineered to a specific purpose.

UNI-FILL

These scratch brushes are uniformly filled. They are trimmed with a "bite" to give the best performance obtainable with hand scratch brushes.



RED CENTER

Red Center Wheel brushes made in various diameters and degrees of stiffness for many different applications are sturdy in construction and in perfect balance.

Brush Division
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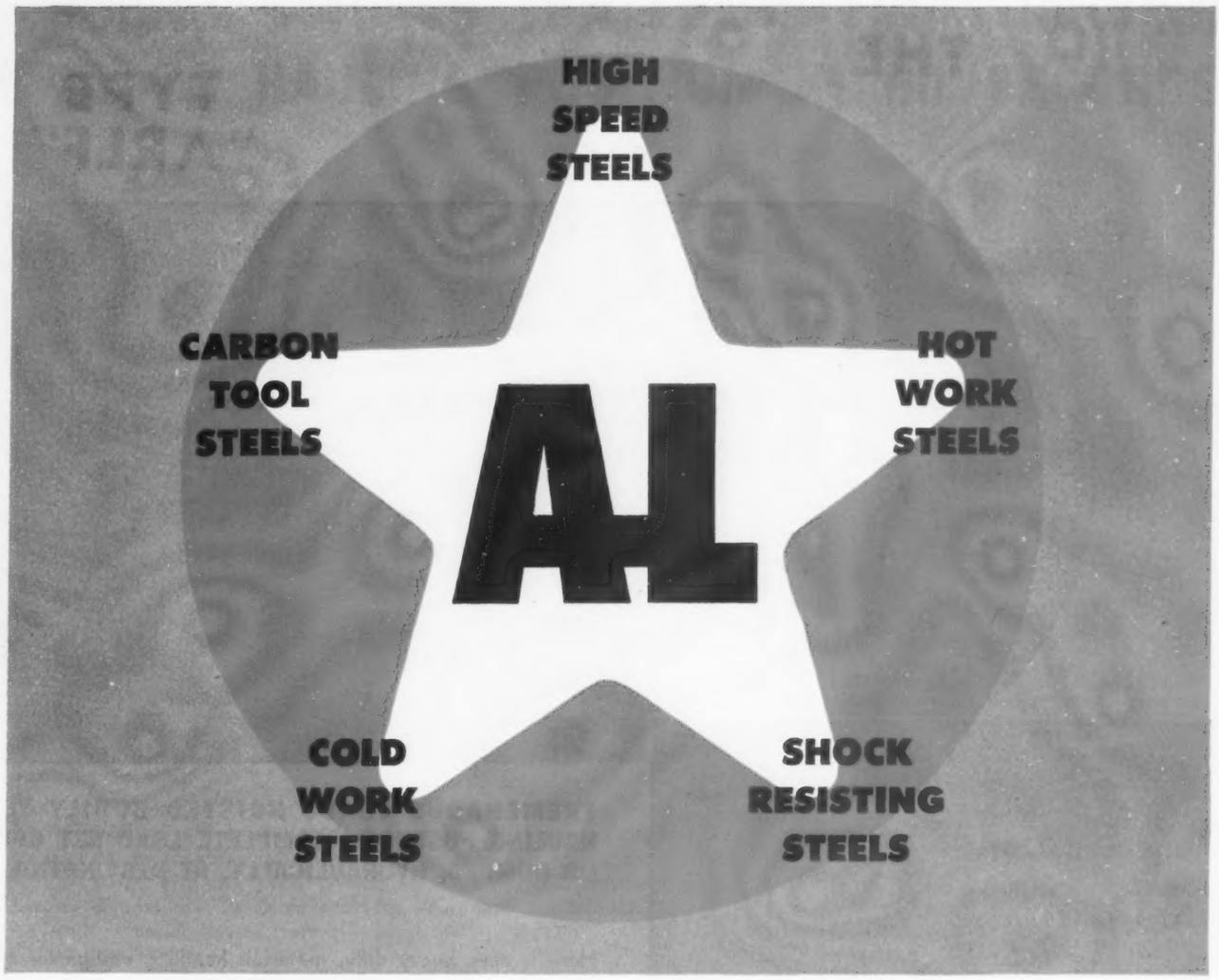


THE *Right* TOOL STEEL FOR YOUR *Individual* REQUIREMENTS

Send for THIS BOOKLET

Complete shop data on the properties, uses, forms, sizes and methods of handling every member of the extensive Allegheny Ludlum family of Tool Steels—170 pages, handily pocket-sized and indexed for easy reference. Write for it today—on your company letterhead, please.

ADDRESS DEPT . . . S-51

NO more using a tool steel that merely comes close to your actual requirements.

Now you can select the steel that fits each of your needs *exactly*—gives you better, faster performance or longer tool life. There's sharp emphasis on cost-reduction today—and in the broadly varied line of Allegheny Ludlum Tool and Die Steels you'll find a type to fit each one of your machine operations like a hand in a glove—the *right* tool steel that can save money for you. It doesn't cost a thing to let our Service Engineers check your tooling set-ups with you—why not call us in?

ALLEGHENY LUDLUM

STEEL CORPORATION · General Offices, Brackenridge, Pa.

Specialloy Steels - EXCLUSIVELY

THE DEMPSTER DUMPSTER TYPE "ARLF"

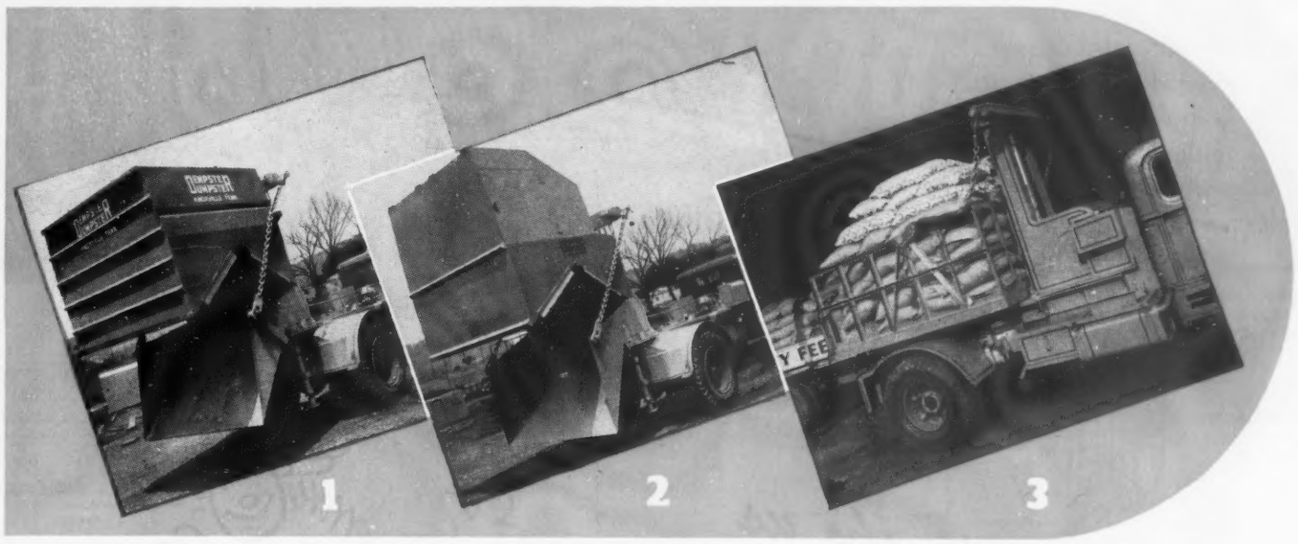
TREMENDOUS LOADS HOISTED BODILY TO HAULING POSITION. COMPLETE LOAD SET OFF OR DUMPED, HYDRAULICALLY, AT DESTINATION.

Here is new, heavy duty, materials handling equipment of major importance to industry. Its obvious possibilities in reducing costs of materials handling by truck makes it a paramount consideration for many firms.

The large photo above serves to indicate the size of large capacity, detachable bodies used with the Dempster-Dumpster Type "ARLF."

Photos at left; Top; you see the "ARLF" unit ready to pick up loaded body. Center; complete load has been raised and is ready for placing in carrying position. Note Automatic, self-aligning, hydraulic stabilizers at rear of unit. Bottom left; you see loaded body in hauling position ready for travel. Directly below; photo shows the "ARLF" dumping load instantly. Complete load, of course, may be placed on ground or platform, bodily, if preferred.

IT HOISTS 5 TO 10 TON LOADS FROM GROUND LEVEL TO HAULING POSITION IN 60 SECONDS



The Dempster-Dumpster Type "ARLF" is a new and important development in the Dempster-Dumpster System of materials handling for industry.

Like other Dempster-Dumpsters—Types "LF" and "LFW," the "ARLF" embodies the principal feature of one truck serving any number of detachable bodies for handling materials of various types. Now, with the Type "ARLF," the Dempster-Dumpster System of materials handling provides equipment for handling materials in capacities of from 1½ to 20 cubic yards, or up to 20,000 pound loads.

With a single truck equipped with the Dempster-Dumpster "ARLF" hoisting unit, any number of various types and capacities of bodies may be served by the same truck unit.

Illustrated directly above, in panel, are three of many different types of Dempster-Dumpster heavy duty, large capacity bodies, built for particular purposes, yet all are served by the same truck. From left to right are shown our Flat-Top, bottom dumping body with self balancing lids; our Pyramid-Top, bottom dumping body, and, a general purpose utility body carrying 15,000 lbs. of feed.

The Dempster-Dumpster system of materials handling by truck assures drastic cuts in investment and maintenance expense where several trucks are normally required for operation. It will eliminate your need for additional trucks because a Dempster-Dumpster equipped truck is never idle . . . is always hauling while bodies are being loaded.

No other trucking equipment saves investment, tires, gas, time and manpower to equal the Dempster-Dumpster. Our engineers will be glad to discuss its possible adaptation to your business.

The photograph above shows the Dempster-Dumpster, Type "LF" with a Skip-Type body in dumping position. Below, the Dempster-Dumpster, Type "LFW" with a special, rubber lined tank, with attached base, for handling chemical liquids.

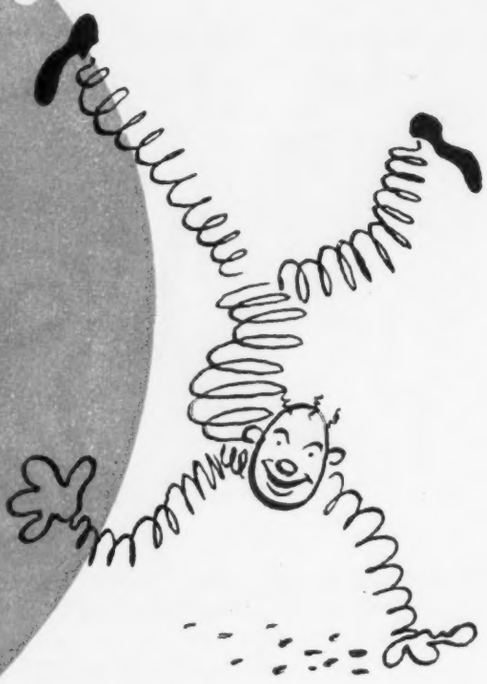
DEMPSTER DUMPSTER
TRADE MARK REG.

DEMPSTER BROTHERS, INC., 556 Springdale, Knoxville 17, Tennessee

handsprings...

are what we turn when a customer is in trouble...

and asks us to help him out—



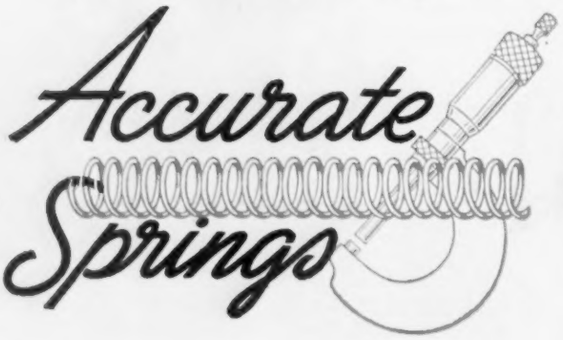
"Look Joe, we're in a tight spot and have to have those springs by next Friday!"

We get calls like that too... and to say we turn the traditional "handsprings" to help a worried customer is putting it mildly. We don't claim to be miracle workers. We try to give speedy and intelligent service at all times. But... when a customer cries "help!"—all of us here at Accurate go out of our way to do anything and everything possible that will help our friend out of a bad situation.

Maybe that's why... every year finds us with more good friends and customers. Maybe too, that's why you should get to know us better.

ACCURATE SPRING MFG. CO.
3823 West Lake Street • Chicago 21, Illinois

Accurate Springs



Springs Wire Forms • Stampings

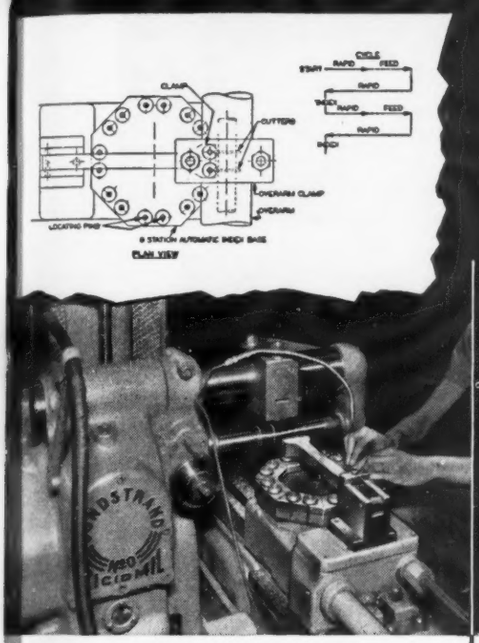
Send for your copy of the new Accurate Spring Handbook. It's full of data and formulae which you will find useful.

No obligation, of course

How to improve MILLING METHODS with SUNDSTRAND "ENGINEERED PRODUCTION"

There are two basic approaches to solving milling production problems: (1) obtaining standard machines, then trying to process parts over these machines as economically as possible, (2) designing the most profitable processing method, then obtaining machines to suit this method—standard or semi-standard machines if possible, or entirely special machines, if necessary.

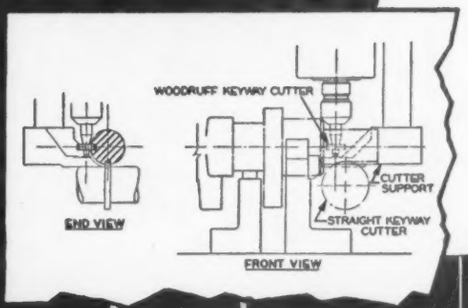
This latter method is Sundstrand "Engineered Production" . . . a most practical approach to economical milling. Here's how it has been applied in three different plants on three different milling problems.

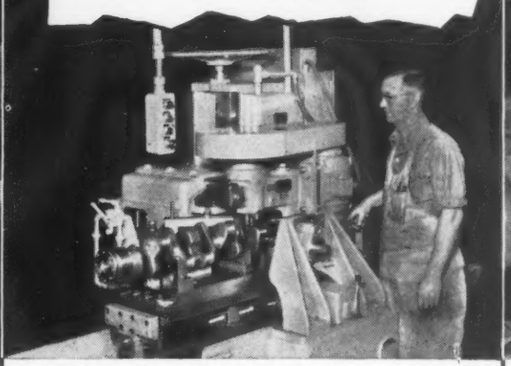


1 STANDARD RIGIDMILS WITH FIXTURES AND TOOLING TO SUIT YOUR WORK

Milling slots in small brass fuse parts on a standard Sundstrand No. 0 Rigidmil. Machine is equipped with a Sundstrand standard automatic index base which makes it possible to produce 800 fuse parts per hour.

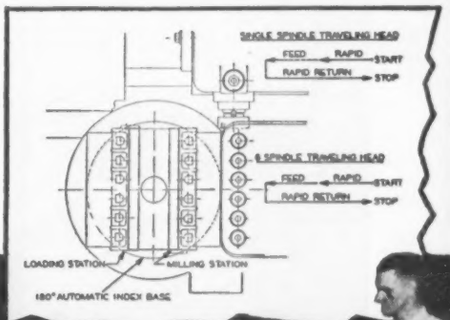
The Sundstrand automatic index base is often used to increase production, improve accuracy and eliminate manual indexing. In addition to increasing production on small parts, its design permits heavy cuts without disturbing accuracy and increases production through eliminating loading time.

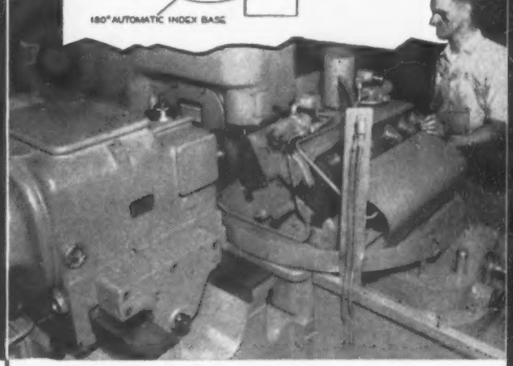




2 RIGIDMILS WITH SPECIAL HEADS AND TOOLING

Simultaneous milling of one Woodruff keyway and one straight keyway in end of crankshaft. Machine is a Sundstrand standard model 22 Rigidmil with standard horizontal spindle head for milling straight keyway and an attached pivoting head for milling the Woodruff keyway. Milling both keyways simultaneously increases production. Further, keyways are held in definite relation to each other by milling in same setting of crankshaft.





3 ENTIRELY SPECIAL MACHINES

Special Sundstrand machine mills 6 angular spark plug seats and faces end of cylinder head. One six spindle traveling head machines the seats while a horizontal spindle head machines the end. A two station fixture is mounted on a 180° automatic index base. Operator loads and unloads in one station while another part is being machined in other station. Clamping and unclamping is hydraulically actuated.

Free

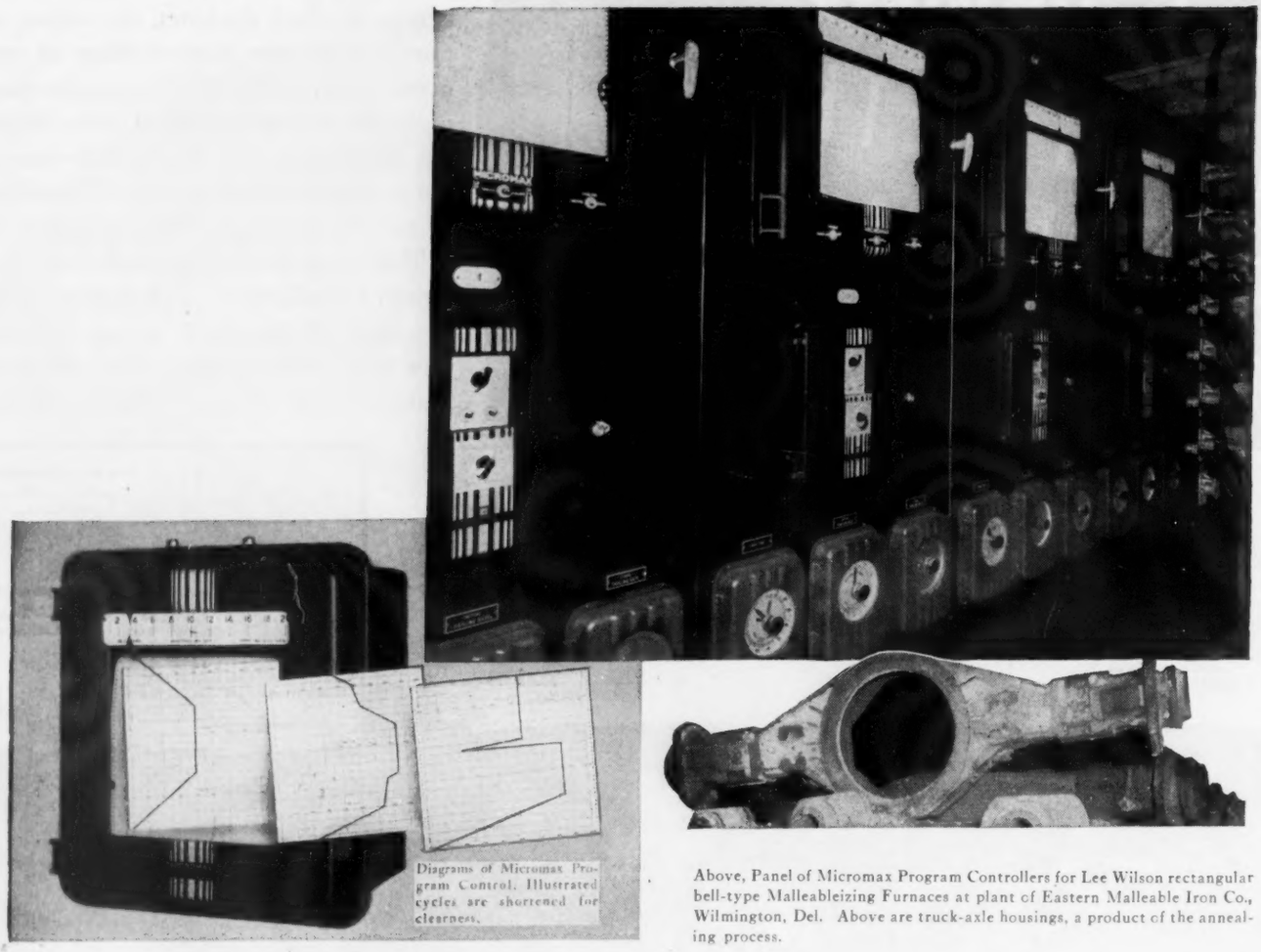
More proof of the successful application of Sundstrand "Engineered" milling production is contained in this book. Over 60 problem solutions complete with tooling diagrams are included. Write for your copy today. Ask for bulletin No. 748.

SUNDSTRAND MACHINE TOOL CO. ROCKFORD, ILLINOIS U.S.A.

SUNDSTRAND MACHINE TOOL COMPANY

2540 Eleventh Street, Rockford, Illinois, U. S. A.

RIGIDMILLS • AUTOMATIC LATHES • SPECIAL MILLING AND TURNING MACHINES



Diagrams of Micromax Program Control. Illustrated cycles are shortened for clearness.

Above, Panel of Micromax Program Controllers for Lee Wilson rectangular bell-type Malleableizing Furnaces at plant of Eastern Malleable Iron Co., Wilmington, Del. Above are truck-axle housings, a product of the annealing process.

PROGRAM CONTROL

Increases the Efficiency of Malleableizing Operations

Automatic control of heating, soaking and cooling rates is making an outstanding contribution to the smooth, economical operation of malleableizing furnaces in the plant of Eastern Malleable Iron Co. Furnaces are Lee Wilson bell-type units, fired with producer gas and equipped with automatic temperature control by means of Micromax Program Control Pyrometers.

The Micromax Electric Control system is used, in which the instruments throttle fuel by means of heavy-duty, electrically-powered valve-drives mounted on the covers. The cable switchboard system at the Control Panel permits any Controller to be used with any valve-drive; an arrangement which gives great flexibility of operation. Heating, soaking and cooling cycles, after being manually pre-set, are automatically maintained with fidelity, to preserve the quality standards needed in good malleableizing.

There is a type of Micromax Program Control to meet the needs of practically any long-cycle heating operation, and an L&N engineer will be glad to help select the one you need, or will send a Catalog, as you prefer.

LEEDS & NORTHRUP COMPANY, 4957 STENTON AVENUE, PHILADELPHIA 44, PA.

LEEDS & NORTHRUP

MEASURING INSTRUMENTS · TELEMETERS · AUTOMATIC CONTROLS · HEAT-TREATING FURNACES

Jrl Ad N-33A-666(1)

CHAMPION
BLUE DEVIL ELECTRODES
(Recommended wherever weld metal of high quality is desired)
USED ON THIS PLANT YARD PIPE JOB!
CHAMPION Blue Devil Welding Electrodes E-6010 represent the most advanced development of the shielded arc type with a high over-all deposit efficiency obtained due to minimum splatter. Excellent penetration makes the Blue Devil especially satisfactory for welding rusty and dirty steel and for field work. For an all-position electrode of outstanding characteristics in construction of ships, bridges, buildings and all types of steel structures—use CHAMPION Blue Devil Electrodes.
Metallurgical tests make CHAMPION WELDING ELECTRODES the leading choice of fabricators who insist upon uniformly satisfactory results and increased production.
WELDING ACCESSORIES
CHIPPING GOGGLES
WELDING MACHINES: A. C. TRANSFORMER TYPES
WELDING GOGGLES
WELDING CLEANING TOOLS
WELDING CLAMPS
SAFETY CLOTHING
WELDING GLOVES
CARBON PASTE & FLUXES
WELDING CABLE CONNECTORS
WELDING CARBONS
CARBON PLATES
WELDING CABLE
WELD SPATTER ELIMINATOR
ELECTRODE HOLDERS
THE CHAMPION RIVET COMPANY
WELDING ELECTRODES

THE CHAMPION RIVET COMPANY

CLEVELAND, OHIO — **EAST CHICAGO, IND.**

EXOTHERMIC ALLOYS

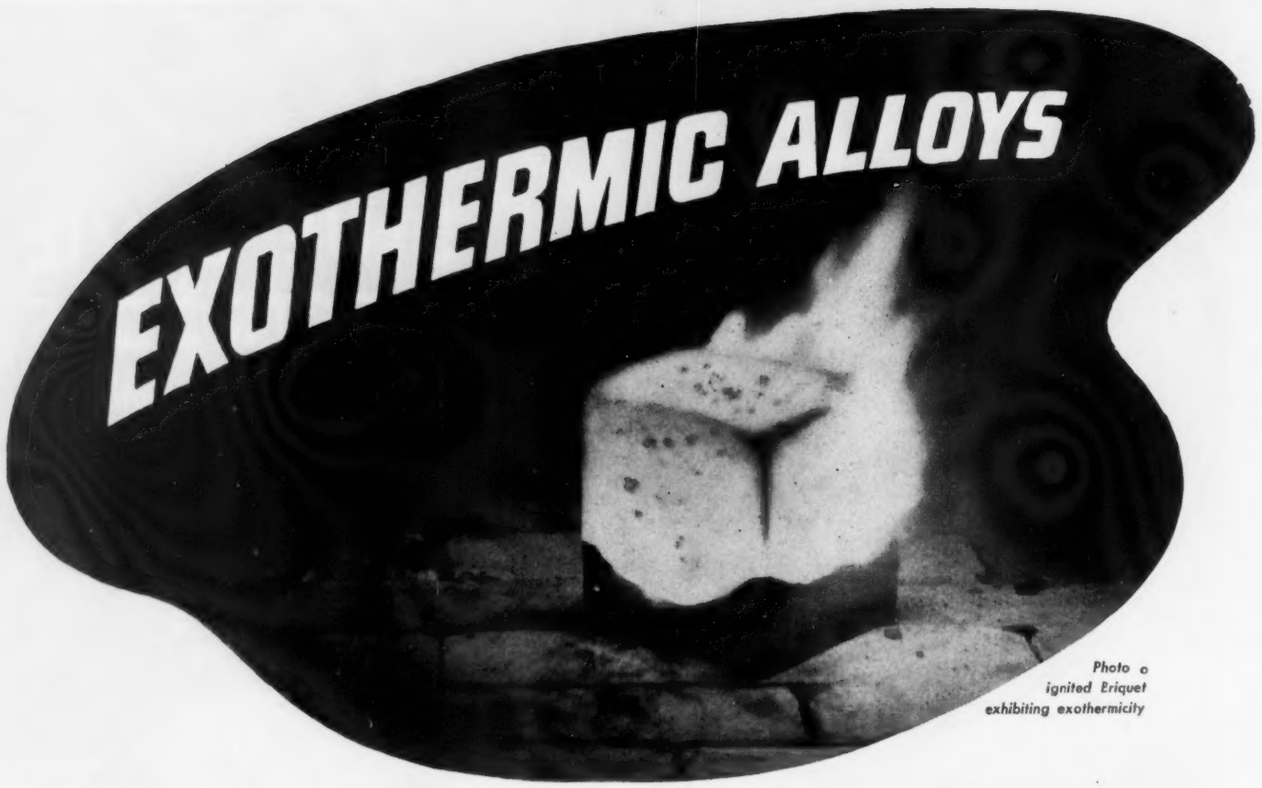


Photo o
ignited Briquet
exhibiting exothermicity

FOR BETTER RESULTS IN STEEL PLANT AND FOUNDRY

Other Exothermic Products of proven value to steel plant operators and foundrymen:

"SIL-X" — Exothermic Ferro-silicon —provides molten ferrosilicon at the desired spot, in furnace, cupola or ladle, resulting in cleaner metal and lower conditioning costs. Two grades: "75" and "145".

"RISER-X"—Exothermic Metal Covering—reduces shrinkage in castings and reduces piping in ingots.

HIGH CARBON "CHROM-X" — Exothermic Ferro-chromium—for furnace or ladle additions, gives higher recoveries of chromium (above 93%) and rapid, uniform distribution of chromium in steel or iron.

Its use results in cleaner metal, improved machinability, increased production and lower costs.

Write for Folder on the use of "Chrom-X", "Sil-X" and "Riser-X"

CHROMIUM
MINING & SMELTING CORPORATION
LIMITED
SAULT STE. MARIE ··· ONTARIO, CANADA

Service Office at
710 Ohio Merchants Trust Building,
Massillon, Ohio

***Sales Agents in U. S. A.* — MILLER & COMPANY, 332 South Michigan Ave., Chicago, Ill.**

HUBCAPS or HANDBAG FRAMES

Baldwin Hydraulic Presses... and Baldwin Engineers... can help you make them

As you plan new products you face these production questions:

HOW FAST... HOW GOOD... HOW MUCH?

Baldwin hydraulic presses may give you the answers. They speed output, boost quality, and cut costs on products such as hubcaps or handbag frames. In many instances Baldwin hydraulic presses convert material into finished product in *one step*, thereby eliminating a series of operations.

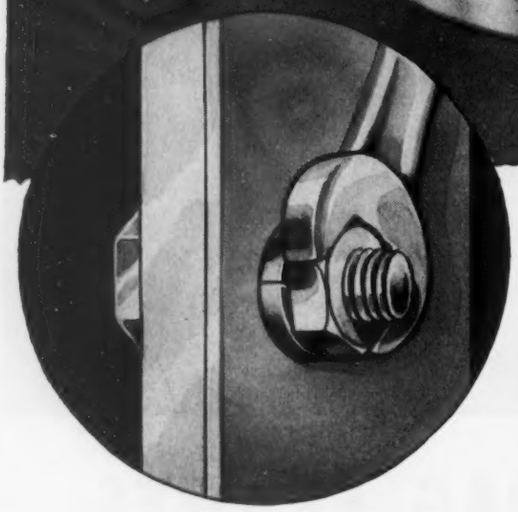
A Baldwin Engineer will be glad to discuss the production possibilities of metal forming presses (or any other type) in your business and recommend profitable applications. Telephone or write the nearest Baldwin Sales Office.

The Baldwin Locomotive Works, Locomotive & Southwark Division, Philadelphia 42, Pa. Offices: Philadelphia, New York, Chicago, St. Louis, Washington, Boston, San Francisco, Cleveland, Detroit, Pittsburgh, Houston, Birmingham, Norfolk.

BLW THE BALDWIN GROUP

BALDWIN
SOUTHWARK
HYDRAULIC PRESSES

USE SPRING LOCK WASHERS



AS BEARINGS

For utility, economy and efficiency you can't beat a spring lock washer as a bearing. It acts as a thrust washer . . . prevents the assembly working loose . . . and at the same time is available at the lowest cost.

But there is a difference in lock washers. Try a Diamond G with Controlled Tension! Tension built right in it, and you'll know why. Diamond G Lock Washers provide positive spring tension . . . plus a full surface to act as a thrust bearing. This permits full tightening of bolts or screws, safeguarding against excessive vibration, shock and wear.

Remember, for safety it's Diamond G! For quality it's Diamond G! For quick deliveries it's Diamond G! Write today for samples and the new folder giving you complete details on the new ASA and SAE specifications on spring lock washers.

GEORGE K. GARRETT CO., INC.
1421 CHESTNUT STREET, PHILADELPHIA 2, PA.
MANUFACTURERS OF

DIAMOND G PRODUCTS

LOCK WASHERS • • FLAT WASHERS • • STAMPINGS • • SPRINGS • • HOSE CLAMPS • • SNAP AND RETAINER RINGS

Mr. Manufacturer:

Don't turn down orders for lack of plant capacity.

Let UNITED be your sub-contractor for the manufacture, to exact specifications, of your heavy industrial machinery and equipment. Why not make use of the available production facilities of our six great plants?

All inquiries will be treated confidentially.

UNITED ENGINEERING AND FOUNDRY COMPANY

PITTSBURGH, PENNSYLVANIA

PLANTS AT PITTSBURGH · VANDERGRIFT · NEW CASTLE · YOUNGSTOWN · CANTON

SUBSIDIARY: ADAMSON UNITED COMPANY, AKRON, OHIO

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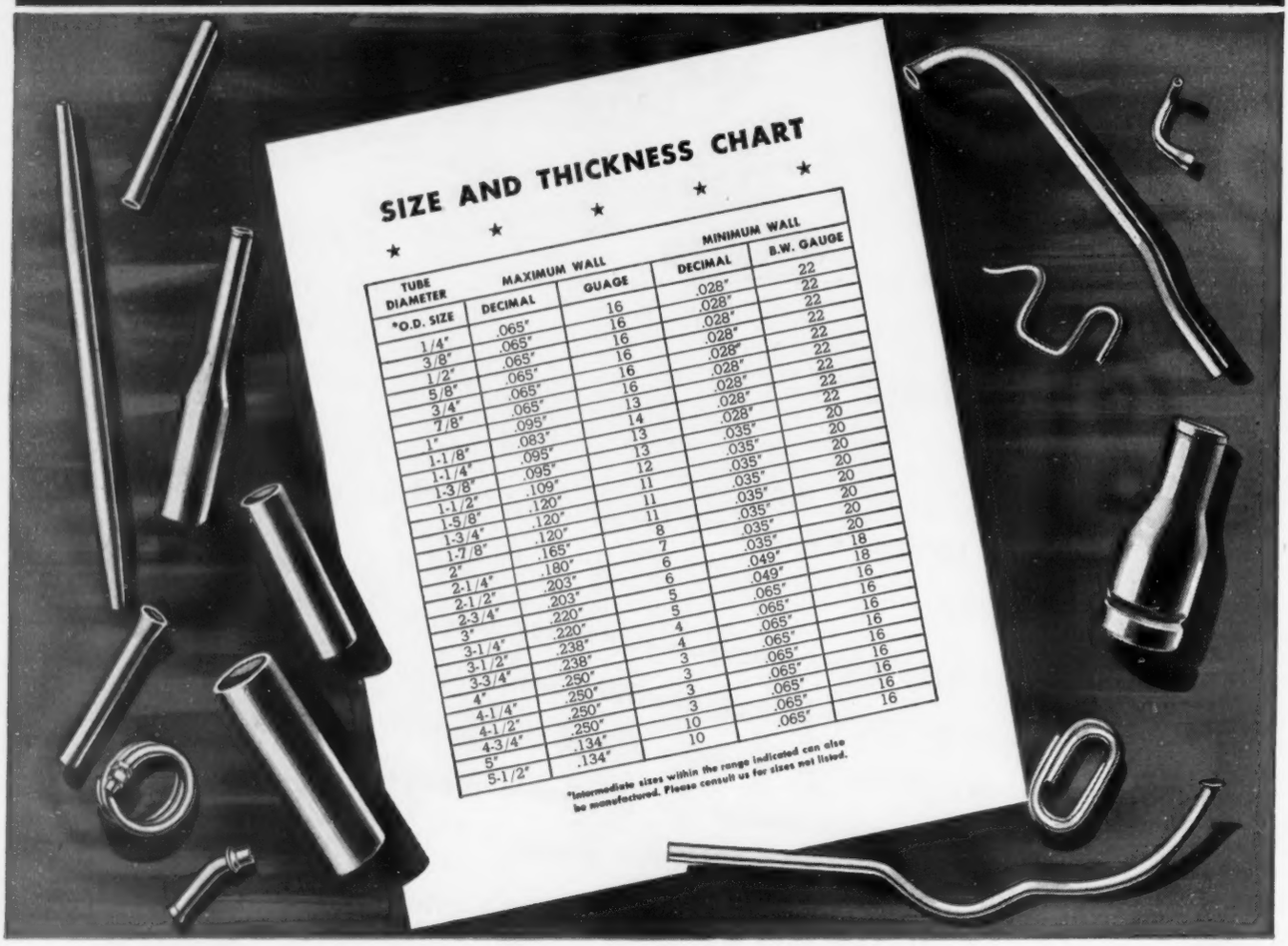
DOMINION ENGINEERING WORKS, LTD., MONTREAL, P. Q. CANADA

The World's Largest Designers and Makers of Rolls and Rolling Mill Equipment

STANDARDIZE WITH "Standard"

ELECTRIC WELDED STEEL TUBING

Fabricated Tubular Parts for Mechanical, Pressure and Structural Applications



TUBE DIAMETER *O.D. SIZE	MAXIMUM WALL DECIMAL	MAXIMUM WALL GUAGE	MINIMUM WALL DECIMAL	MINIMUM WALL B.W. GAUGE
1/4"	.065"	16	.028"	22
3/8"	.065"	16	.028"	22
1/2"	.065"	16	.028"	22
5/8"	.065"	16	.028"	22
3/4"	.065"	16	.028"	22
7/8"	.095"	13	.028"	22
1"	.083"	14	.028"	22
1-1/8"	.095"	13	.035"	20
1-1/4"	.095"	13	.035"	20
1-3/8"	.109"	12	.035"	20
1-1/2"	.120"	11	.035"	20
1-5/8"	.120"	11	.035"	20
1-3/4"	.120"	11	.035"	20
1-7/8"	.165"	8	.035"	20
2"	.180"	7	.035"	18
2-1/4"	.203"	6	.049"	18
2-1/2"	.203"	6	.049"	16
2-3/4"	.220"	5	.065"	16
3"	.220"	5	.065"	16
3-1/4"	.238"	4	.065"	16
3-1/2"	.238"	4	.065"	16
3-3/4"	.250"	3	.065"	16
4"	.250"	3	.065"	16
4-1/4"	.250"	3	.065"	16
4-1/2"	.250"	3	.065"	16
4-3/4"	.250"	3	.065"	16
5"	.134"	10	.065"	
5-1/2"	.134"	10		

*Intermediate sizes within the range indicated can also be manufactured. Please consult us for sizes not listed.

With every year that passes, more and more manufacturers of products calling for ELECTRIC WELDED STEEL TUBING are discovering the advantages of specifying the "Standard" brand. They find that our wide variety of shapes and sizes, plus our facilities for high speed production afford them the means of getting the kind of tubing they want—when they want it. And they find that our interested and willing cooperation in the solving of special tubing problems helps them make their products quicker and at lower cost. These same advantages are available to you. If you are looking for a source of high quality ELECTRIC WELDED STEEL TUBING it will pay you to investigate our experience and facilities.

THE STANDARD TUBE CO.

Detroit 3, Michigan

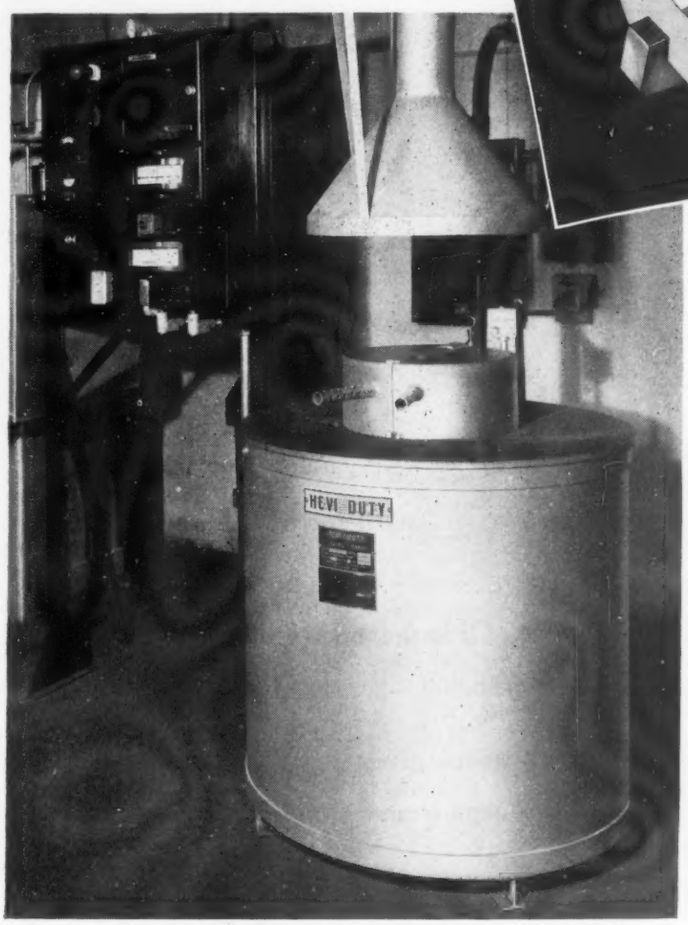
Welded Tubing *Steel Forgings*

★ *Complete Tube Stocks Maintained by* ★

STANDARD TUBE SALES CORP., One Admiral Ave., Maspeth, L. I., N. Y.
LAPHAM-HICKEY COMPANY, 3333 W. 47th Place, Chicago 32, Ill.
UNION HARDWARE & METAL CO., 411 E. First St., Los Angeles 54, Cal.

The Wetmore Blade

(REAM-MOR PROCESSED)



An HD-1224 Electric Pot Furnace at the Wetmore Reamer Company, Milwaukee.

"Ream-Mor" processing is an additional heat treatment, by molten salt, given to certain types of high alloy Wetmore blades. As a result, the blade surface becomes extremely hard while maximum core toughness is retained. The Wetmore Reamer Company, Milwaukee, use a Hevi Duty Electric Pot Furnace for this processing and in addition use this furnace for scale free hardening of alloy and tool steels, miscellaneous drawing operations and silver brazing. Write for Bulletin HD-635 — it details construction, uses and sizes of this furnace.

HEVI DUTY ELECTRIC COMPANY

HEAT TREATING FURNACES HEVI DUTY ELECTRIC EXCLUSIVELY

MILWAUKEE, WISCONSIN

it's a good trick, if you can do it . . .

"DUCTILITY WITH STRENGTH"

ACTUAL PHOTOGRAPH

Speed Case Steel (.20 carbon) 1 inch cold drawn bar tied in a knot, cold, without fracture.

SPEED CASE x1515

A LOW CARBON OPEN HEARTH PRODUCT

But it's no trick when you use SPEED CASE! It's the *ONLY* Low Carbon Open Hearth steel that has high Physicals and excellent Ductility, yet cuts like A.I.S.I. B1113 . . . 250 S.F.P.M. If you require a steel with a tensile of 80,000-90,000 PSI, *plus DUCTILITY* . . . SPEED CASE is the answer; and—remember—IT CUTS LIKE BESSEMER!

Write for our Brochure which gives complete data and Case Histories furnished by our customers.

Tear this off . . . ATTACH TO YOUR LETTERHEAD AND MAIL TO EITHER COMPANY BELOW

Licensee for Eastern States

THE FITZSIMONS COMPANY

YOUNGSTOWN, OHIO

MANUFACTURERS OF A COMPLETE LINE OF COLD FINISHED CARBON AND ALLOY STEEL BARS

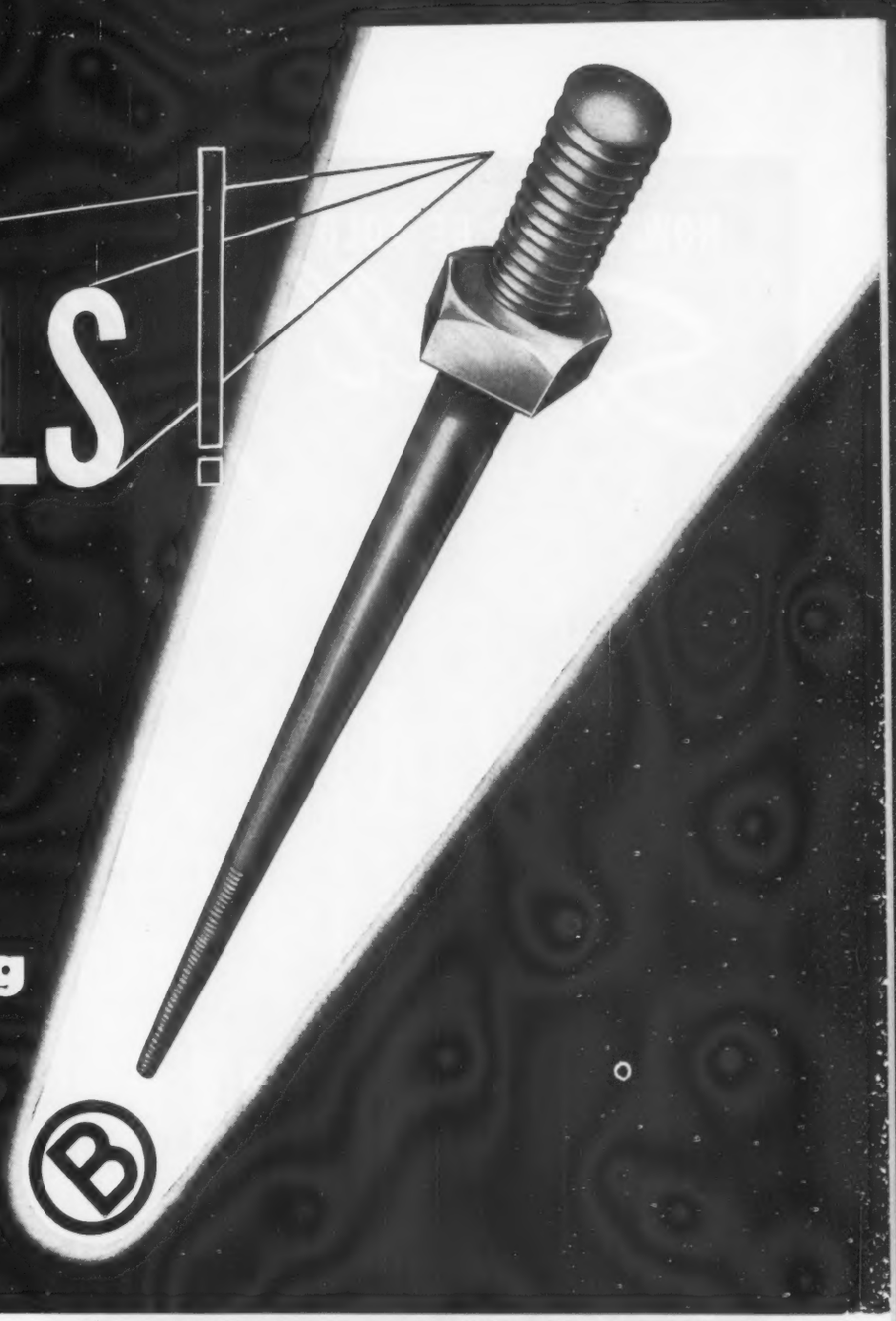
Licensor

MONARCH STEEL COMPANY

HAMMOND · INDIANAPOLIS · CHICAGO

PECKOVER'S LTD. Toronto, Canadian Distributor

SPECIALS!



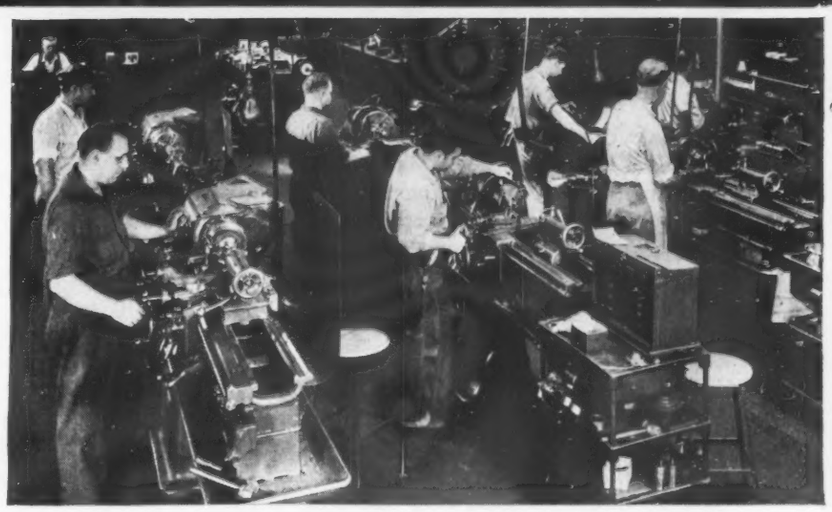
. . . convincing evidence of manufacturing skill

● The complexity of modern, manufactured items reflects itself in the increasing demands for special type nuts and bolts. The unusual bolt illustrated, for example, is a vital part of the compressor unit of a national brand refrigerator.

Years of experience plus the fact that all circle Ⓑ fasteners are controlled from billet to bolt in one single plant—*the largest independent in the country*—naturally make the Buffalo Bolt Company the logical starting point for any producer with a nut or bolt problem.

Whether they are standard or special, all circle Ⓑ products have the same uniform, controlled quality that serves to make your production more efficient . . . your products more salable.

Did You Know that we have our own large machine shop where dies are carefully made by our own skilled toolmakers



BUFFALO BOLT COMPANY

NORTH TONAWANDA, N. Y. • SALES OFFICES IN PRINCIPAL CITIES

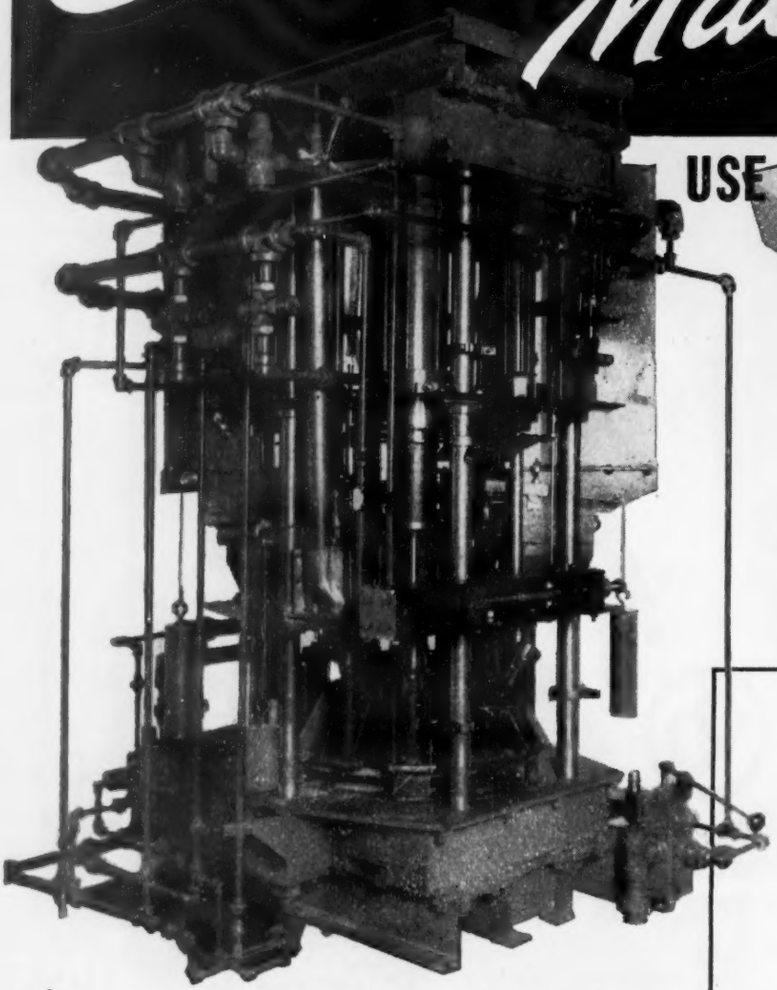
Export Sales Office: Buffalo International Corp., 50 Church Street, New York City

NOW IT CAN BE TOLD

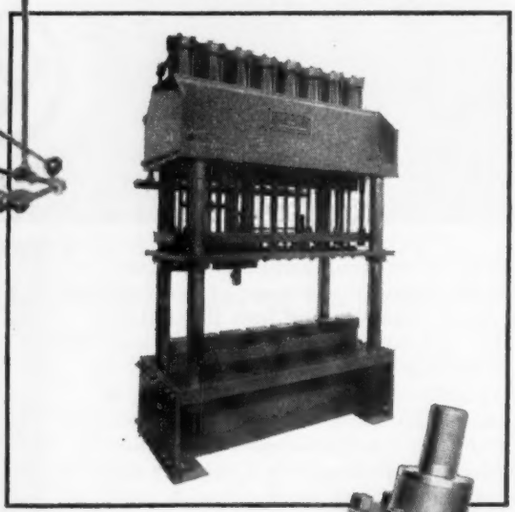
Shell-loading Machines-

USE T-J

CYLINDERS



T-J Hydraulic Cylinders on these machines press different ingredients into shells at very accurate pressures. At left, rotary type press—which also employs small cylinder (shown on front) for indexing. Below, "straight eight" type loading press.



Among the wide range of war production jobs performed by T-J Cylinders is this application on shell-loading machines manufactured by Proctor & Schwartz, Inc., Philadelphia. The machines are hydraulically operated and *entirely automatic*—depending on the high efficiency and accuracy of T-J Cylinders!

Similarly—for hundreds of tough jobs of power movement in industry today—you'll find T-J Air and Hydraulic Cylinders a real time-saver, muscle-saver and money-saver! Ideal for jobs where pushing, pulling or lifting is needed . . . 100 lb. or 50,000 lb. Available in many standard sizes and styles . . . both cushioned and non-cushioned types. Backed by 29 years' experience . . . precision-built for unbeatable performance! Write for latest catalogs. The Tomkins-Johnson Co., Jackson, Mich.

FOR TOUGH JOBS SPECIFY

TOMKINS-JOHNSON

RIVITORS...AIR AND HYDRAULIC CYLINDERS...CUTTERS...CLINCHORS

T-J

PERFORMANCE PROVES THE VALUE OF

HOUGHTON'S MAR-TEMP OIL...

for hot quenching

For distortion-free hardening within the range of 250-400° F., Mar-Temp Oil is proving most helpful, as borne out by these production reports:

SPLINE SHAFTS — When formerly quenched at room temperature these shafts had to be straightened to be within the maximum tolerance of .003". Now, quenched in Mar-Temp Oil at 350° F., distortion never exceeds .002", less than the prescribed limit.

GRINDER SHAFTS — 8" long, are being carburized in salt and quenched in oil at 350° F., with less than .0005" distortion.

GEAR BLANKS of NE 8620 steel are liquid-carburized at 1675° F. for 5 hours (.050" case) and hot-oil-quenched at 350° F. Parts are cleaner than ever before, cleaning time only one-third of that formerly required.

GUIDE BARS — 14" long, for a machine tool; formerly fixture-quenched, now hardened in Mar-Temp Oil at 350° F., with far less tendency to distort than when air-cooled.

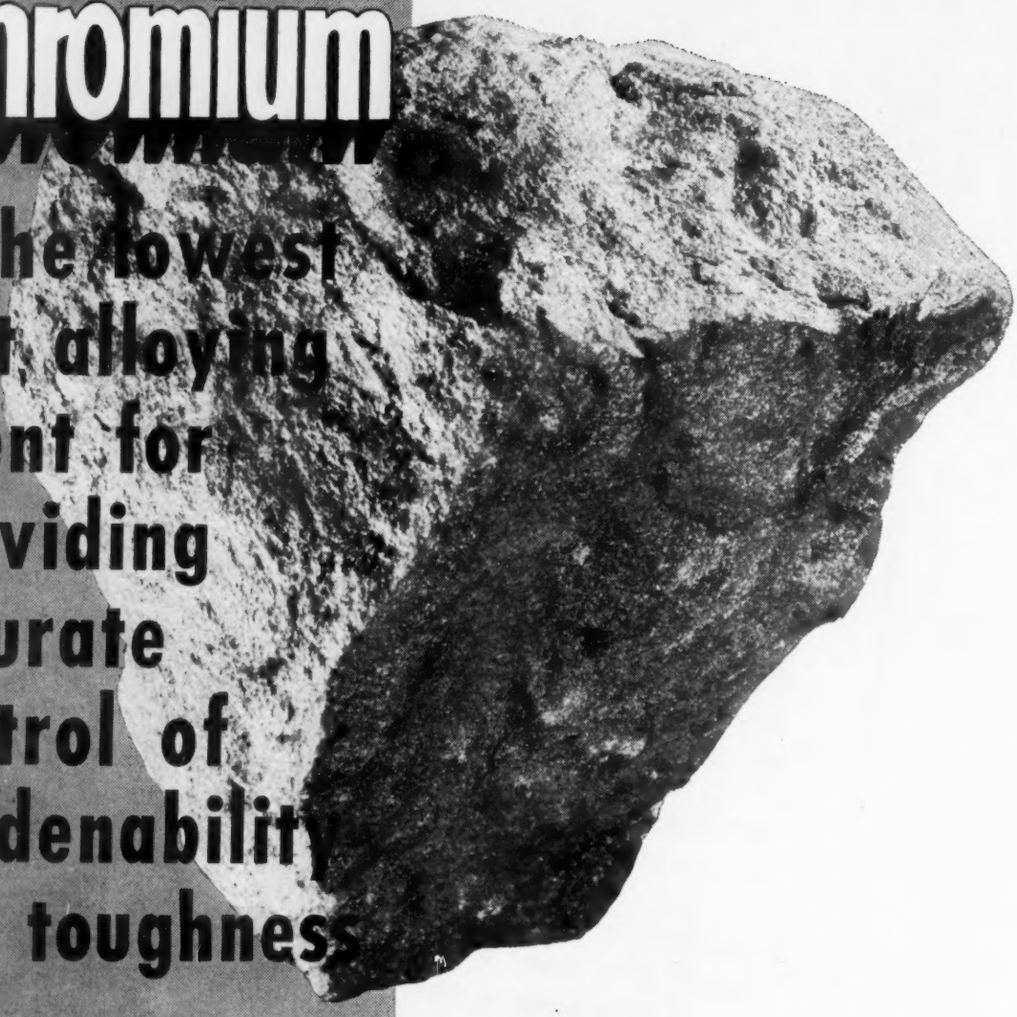
Mar-Temp Oil fills a needed place in the zone between room temperature quenching and salt bath interrupted quenching above 450° F. If distortion is your problem, write for the new Mar-Temp Oil folder.

E. F. HOUGHTON & CO.

303 W. LEHIGH AVE. • PHILADELPHIA 33, PA.

OHIO FERRO-ALLOYS CORPORATION
. . . a major supplier of **STANDARD H C FERRO CHROME**

Chromium



is the lowest cost alloying agent for providing accurate control of hardenability and toughness

FERRO SILICON 50%, 75%, 85%, 90%
H C FERRO CHROMIUM • FERRO MANGANESE
BOROSIL • SIMANAL

BRIQUETS
SILICON • MANGANESE • CHROME

PHILO RAINIER

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Ohio Ferro-Alloys Corporation
Canton, Ohio

Chicago Detroit Pittsburgh San Francisco Tacoma

SURPLUS HOBART ARC WELDERS

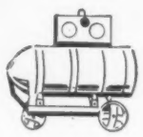
200, 300 AND 400 AMPERE RATINGS

Three million dollars worth of surplus Hobart Arc Welders *must* be sold between May 15th and June 15th. Most of this equipment is of the MG type but some quantity is available in gasoline driven units. Arrangements may be made to inspect the offered items. Largest inventories are located at Boston, Detroit, Cleveland, Chicago, Atlanta, Kansas City, Richmond and Philadelphia—but information on availability, condition and location may be obtained at any of the War Assets Administration Regional Offices listed below. The equipment will be sold on a "where is, as is" basis . . . used or unused . . . and priced accordingly. For full information contact the nearest office listed below or check and mail this coupon.

ALSO MANY OTHER TYPES OF WELDING AND FLAME CUTTING EQUIPMENT

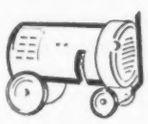
LINCOLN

Hundreds of Lincoln Arc Welders in the popular 300-400 Ampere size are also available; some gasoline engine driven.



WESTINGHOUSE

Flexarc equipment for production or construction operations is available in smaller quantity. Also other standard makes and ratings.



RESISTANCE WELDERS

Spot Welders located in Philadelphia, Detroit, Chicago, Los Angeles, Cleveland and Kansas City; *Seam Welders* in Cleveland, Chicago, Detroit, Birmingham, Boston and Philadelphia. Also *Flash Welders.*

WELD POSITIONERS

In standard sizes and types, are located in Detroit, Boston, Chicago and New York.

FLAME CUTTERS

Save production time and money with portable or stationary, single or multiple torch flame cutting machines. All types of gas cutting equipment available for quick sale.

VETERANS OF WORLD WAR II—To help you in purchasing surplus materials, a veterans' unit has been established in each War Assets Administration Regional Office.

FREE SALE FACTS

To War Assets Administration:
Please send me information prior to your sale on the availability, condition and location of Hobart Arc Welders of the following

types:..... and ratings:.....

.....

.....

I am also interested in:—

- ☐ *LINCOLN ARC WELDERS*
- ☐ *WESTINGHOUSE ARC WELDERS*
- ☐ .....*ARC WELDERS* (other)
- ☐ *SPOT, SEAM, FLASH WELDERS*
- ☐ *WELD POSITIONERS*
- ☐ *FLAME CUTTERS*

Name.....

Firm.....

Address.....

City..... State..... 176-2

All items subject to prior sale

WAR ASSETS ADMINISTRATION

OFFICES LISTED BELOW ARE TEMPORARILY IN RECONSTRUCTION FINANCE CORPORATION AGENCIES

Offices located at: Atlanta · Birmingham · Boston · Charlotte · Chicago · Cleveland · Dallas · Denver Detroit · Helena · Houston · Jacksonville · Kansas City, Mo. · Little Rock · Los Angeles · Louisville Minneapolis · Nashville · New Orleans · New York · Oklahoma City · Omaha · Philadelphia Portland, Ore. · Richmond · St. Louis · Salt Lake City · San Antonio · San Francisco · Seattle · Spokane Cincinnati · Fort Worth (Telephone 3-5381)

This Rotary Plow Feeder RUNS ITSELF

Arrows indicate units of Reliance V★S Drive on Robbins Rotary Plow Feeder at ore-mixing plant of Colorado Fuel and Iron Corporation.

With Reliance V★S Drive

This materials-handling machine works like a robot—moving back and forth all day long at the exact speed required to plow a steady stream of material onto a conveyor belt.

Here is another unusual use of Reliance V★S Drive which demonstrates its amazing versatility. V★S—*the All-electric, Adjustable-speed Drive operating from A-c. Circuits,* provides smooth speed changes over practically an unlimited range, with automatic reversing, starting and stopping. Let a Reliance Engineer show *you* how V★S Drive—rotating or electronic system—can speed up operations and lower costs. Write for Bulletin 311.

RELIANCE ELECTRIC & ENGINEERING CO.
1081 Ivanhoe Road • Cleveland 10, Ohio

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RELIANCE A-C D-C MOTORS

"Motor-Drive is More Than Power"

VANADIUM

Gives Steel

EXTRA STRENGTH

FATIGUE RESISTANCE

WEAR RESISTANCE

SHOCK RESISTANCE

INCREASED TOUGHNESS

Small percentages of vanadium — 0.05 to 0.15 per cent — are used effectively for making fine-grained steels having high dynamic strength, toughness and resistance to fatigue and wear.

Most high-speed tool steels contain vanadium, for it gives them better forgeability and improved cutting efficiency. The presence of vanadium helps to maintain cutting properties at elevated temperatures. Some nitriding steels and many types of engineering and structural steels also contain vanadium.

In steel castings, a small amount of vanadium — usually not more than 0.10 per cent — refines grain, materially raises yield strength without sacrificing ductility, and greatly increases resistance to shock and fatigue. Such vanadium-bearing steels are widely used for railroad car and engine parts such as main frames, crossheads, pistonheads, wheel centers, and driving boxes.

Wrought chrome-vanadium steels are used for springs and for other applications where high dynamic strength is essential.

If you need technical help in the use of ferrovanadium or other ferro-alloys, our field metallurgists will be glad to help you. For more information about these alloys and this service, write for the booklet, "Electromet Products and Service."

"Electromet" is a registered trade-mark of Electro Metallurgical Company.

ELECTRO METALLURGICAL COMPANY

Unit of Union Carbide and Carbon Corporation

30 East 42nd Street UCC New York 17, N. Y.

ELECTROMET Ferro-Alloys and Metals are sold by Electro Metallurgical Sales Corporation, and Electro Metallurgical Company of Canada, Limited, Welland, Ontario

Electromet
Trade-Mark
Ferro-Alloys & Metals

Only J-M FIREBLOK offers all these advantages

Lighter Weight. Although more than five times the size of an ordinary fire brick, a Fireblok weighs practically the same.

Fewer Joints. Fireblok's larger size reduces number of joints . . . cuts down on amount of cement needed for bonding (J-M 1626 Cement was specially developed for this purpose).

Better Workability. Fireblok are easily worked with saw, drill or rasp. Can be cut as required . . . eliminating large stocks of special shapes.

Larger Size. You can measure this advantage of J-M Insulating Fireblok with a yardstick! Because it is 5 times larger than ordinary brick, installation is faster . . . furnace downtime is cut to a minimum.

Increased Thermal Efficiency—results from Fireblok's broader, uninterrupted surfaces. Particularly recommended for industrial furnaces, flues, stacks and similar equipment . . . also for lining doors, and, when tapered, for sprung arches of exceptional stability. Like J-M Insulating Fire Brick, Fireblok comes in different types, each developed for a specific temperature range. For full details, write Johns-Manville, Box 290, New York 16, N. Y.

JM-20 Fireblok for use up to 2000°F. Exposed or back-up.

JM-23 Fireblok for use up to 2300°F. Exposed or back-up.

JM-26 Fireblok for use up to 2600°F. Exposed or back-up.

JOHNS-MANVILLE *First in* INSULATIONS

COMPLETE GRINDING WHEEL SERVICE *for the FOUNDRY*

INCLUDING THE NEW *B-5 RESINOID!*

SWING FRAME GRINDERS AND FLOOR STANDS

PORTABLE GRINDERS — DISC GRINDERS

Outstanding records are being made in foundry after foundry by the new Norton B-5 resinoid wheel for high speed grinders. Operators like its fast, smooth cutting action. Management likes the economy of its long life. B-5 resinoid bond is available in Alundum and 57 Alundum Wheels for steel and unannealed malleable castings and in Crystolon wheels for gray iron, annealed malleable, brass and aluminum castings. For slow speed grinders (up to 6500 s.f.p.m.) there's a complete line of vitrified bonded wheels in Alundum, 15 Alundum and Crystolon abrasives.

CUT-OFF MACHINES are the most economical method of removing gates and risers from non-ferrous castings and some steel castings. Norton has a complete line of cut-off wheels specially developed for the work—rubber or resinoid bonded.

MOUNTED WHEELS AND POINTS are the easiest way to clean castings in the hard-to-get-at places—available in Alundum or Crystolon abrasive.

FOR THE CORE ROOM there are Norton Core Files for smoothing and shaping sand cores and Norton Cut-off Wheels for cutting stock cores to length.

Let a Norton abrasive engineer study all your cleaning room jobs.

NORTON COMPANY, WORCESTER 6, MASS.

NORTON ABRASIVES

W-1055

automatic shears by HALLDEN

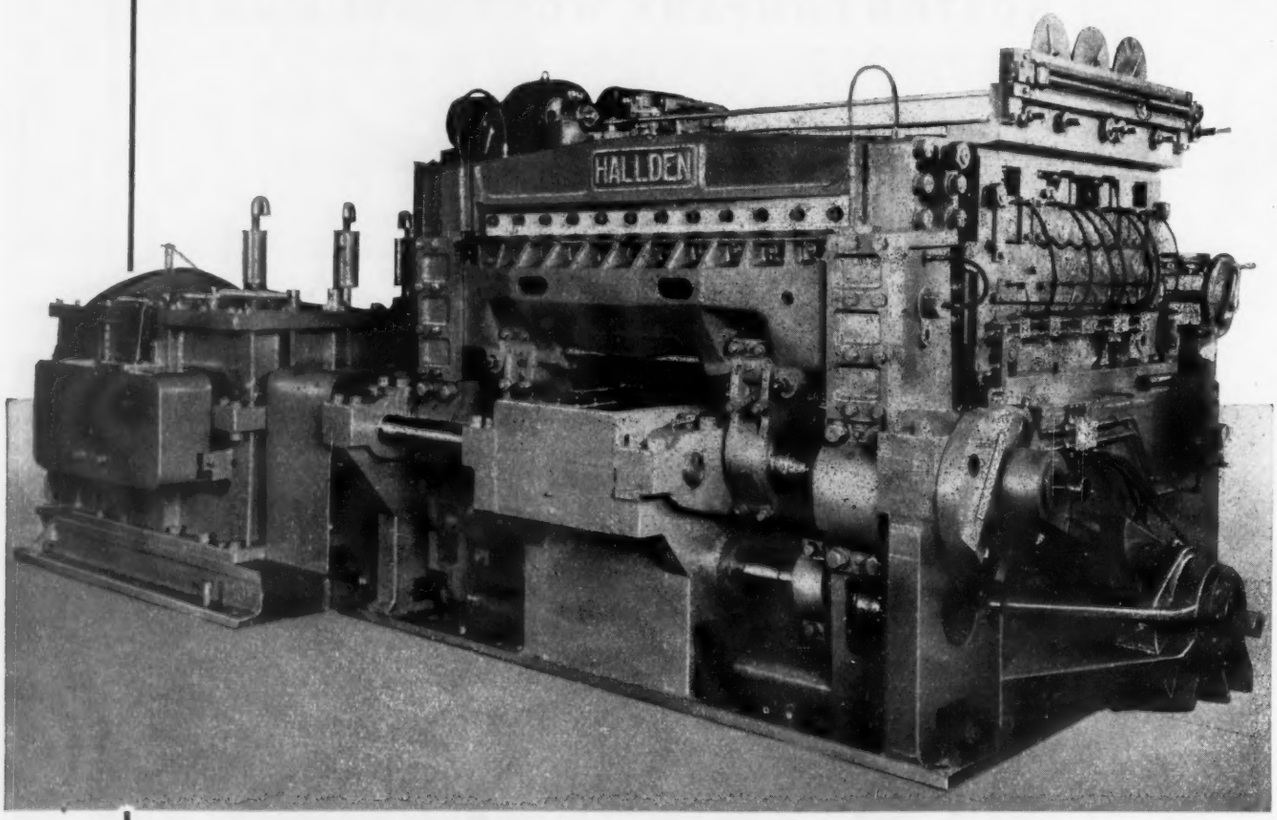
Here's a machine that takes the strip metal from coil, hot bed, or trimmer, flattens it, cuts it accurately into pieces of predetermined length, and piles the pieces neatly upon a conveyor, table or truck. It is a triumph of Hallden engineering.

Consisting of two units, a flattener and a flying shear, it is driven in combination and so timed that during the period of cutting off, the shear moves forward with the exact speed of the metal. The flying shear is a rocker type guillotine design, constructed of a special alloy welded steel. Shear knives are standard type. Each blade has four cutting edges; top and bottom blades are interchangeable, and both blades always move in a mutual plane.

The flattener consists of a 10-roll flattener with two pairs of feed rolls, each roll driven through a coupling. Flattening rolls are constructed of an alloy chrome steel, hardened and ground to a scleroscope of 90. All rolls are easily removed for grinding.

The machine is designed to cut the metal lengths to an accuracy of 1/32 of an inch. Heavy and rugged, with a low center of gravity, it stands up under continuous service without any attention other than oiling. Simple, rugged and entirely automatic, it is very compact and requires little space.

Hallden Automatic Flattening and Cutting Machine for ⅛" Thick Steel Strip No. 56



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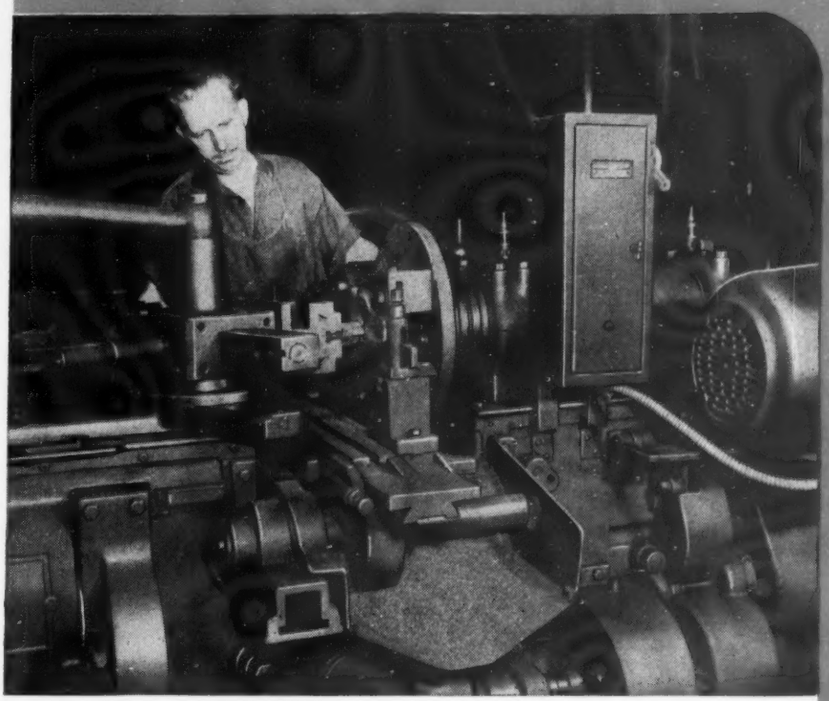

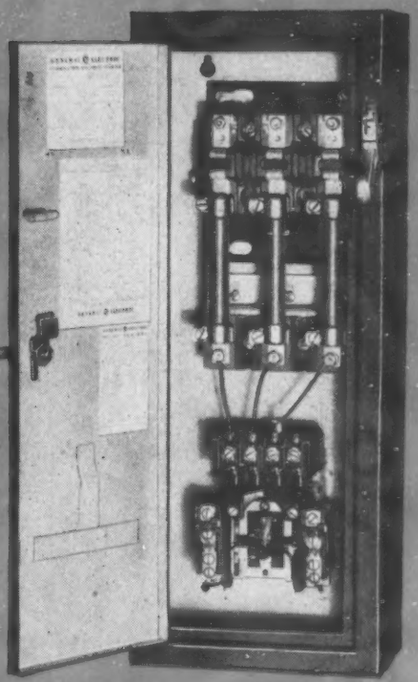

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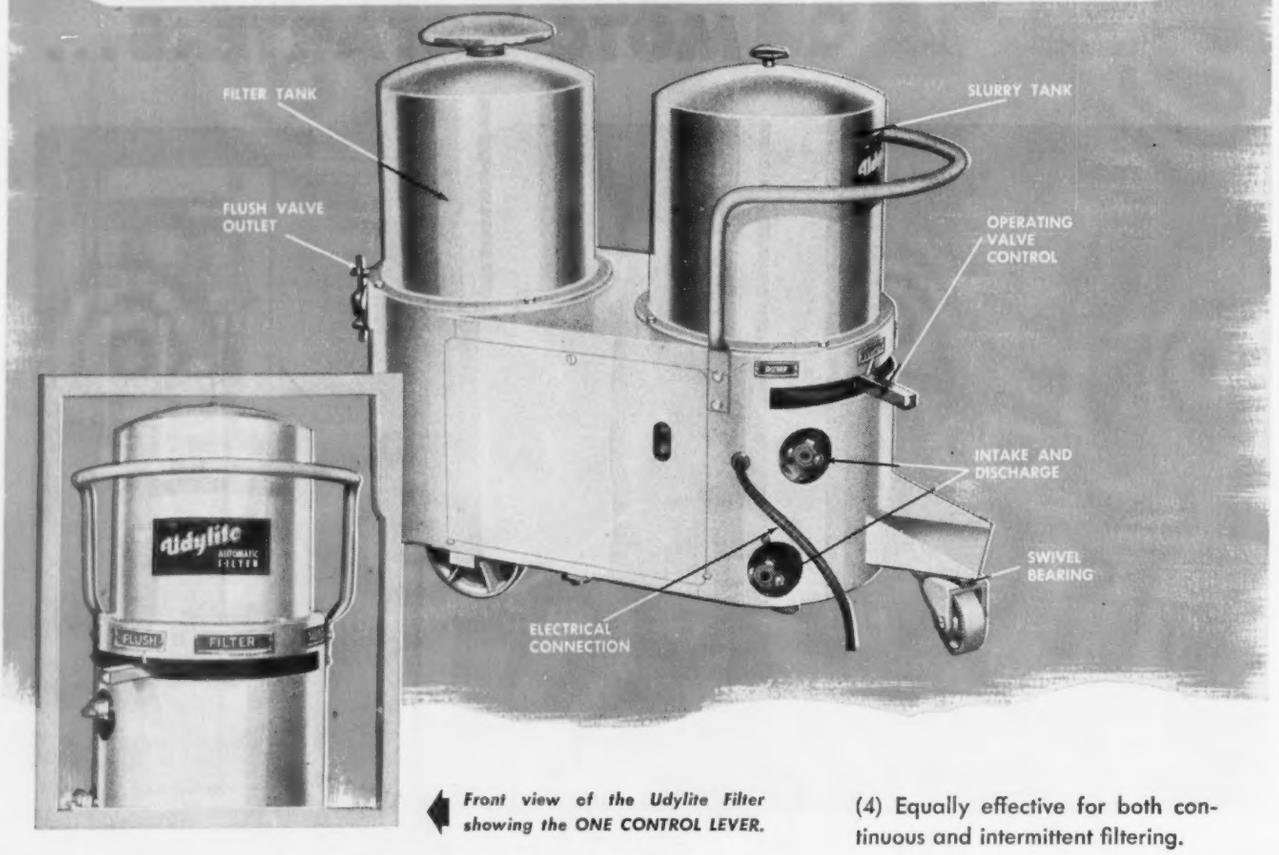

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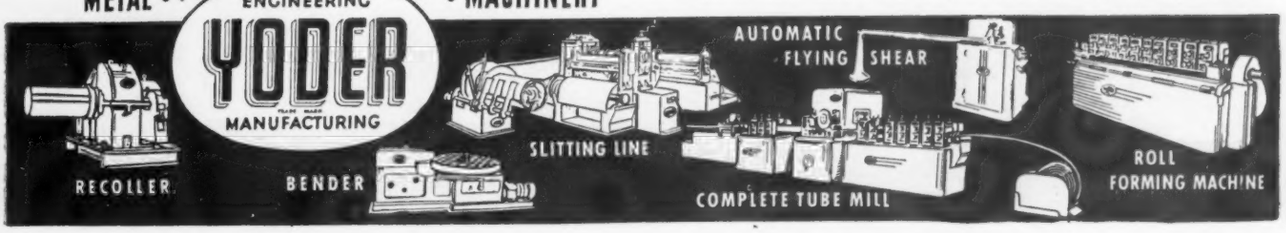

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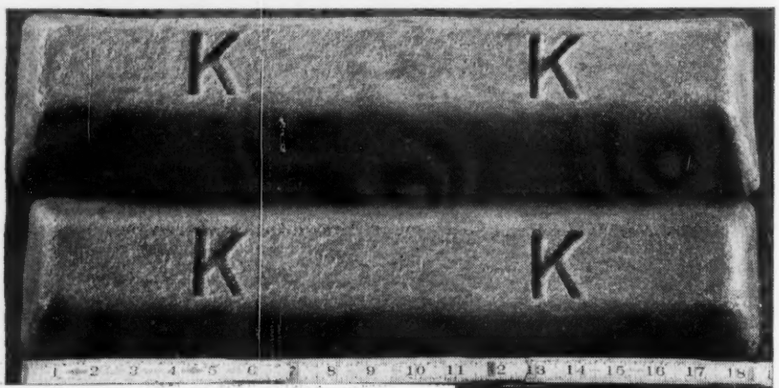

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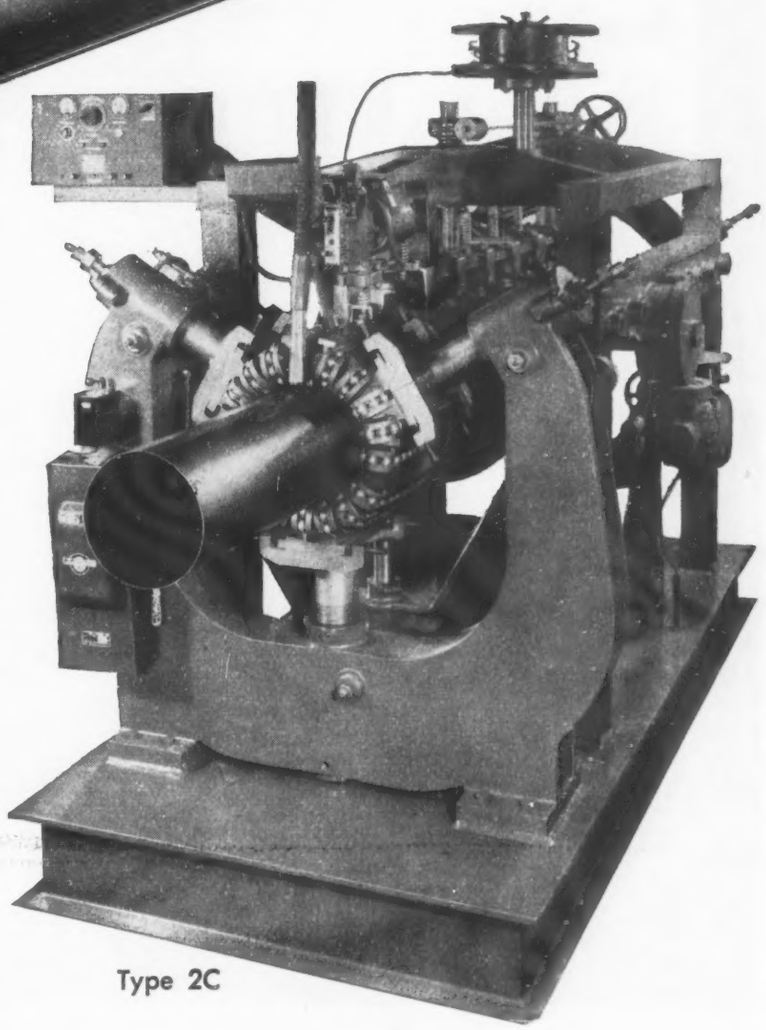

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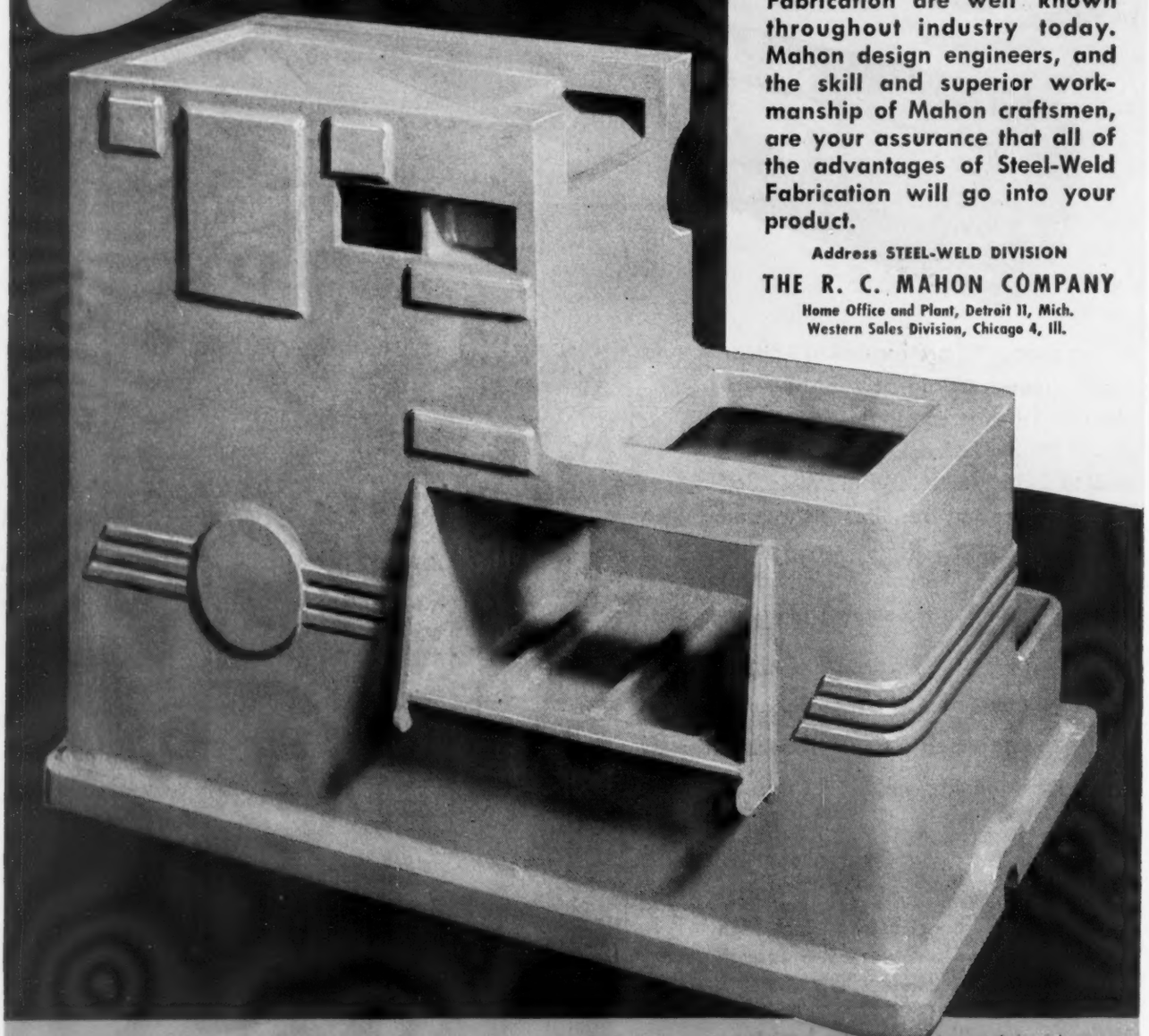

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STEEL

The Magazine of Metalworking and Metalproducing

VOL. 118, NO. 18 MAY 6, 1946

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Air-Operated Fixtures Increase Production

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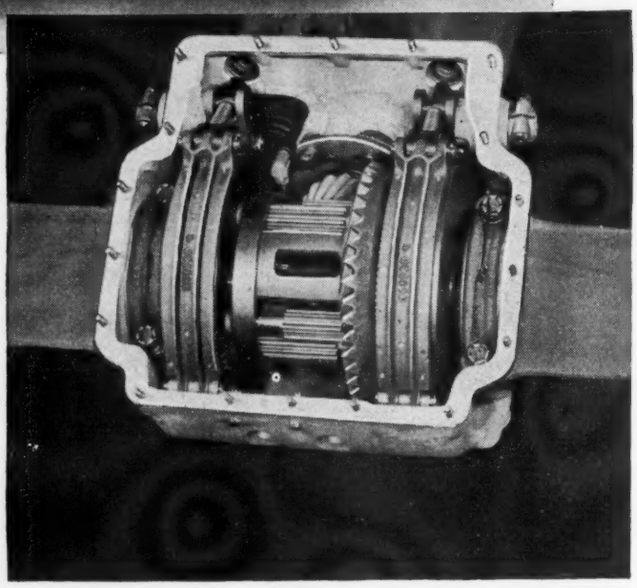

1. *The famous Water Buffalo transmission with cover off. Manufactured by Spicer.*

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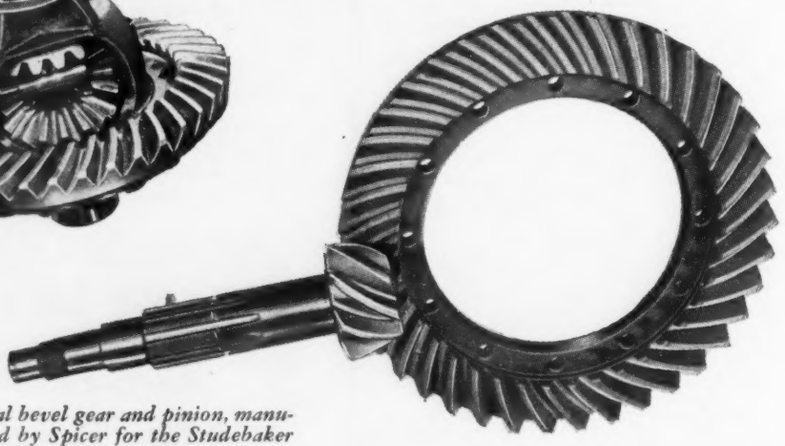


3. *Spiral bevel gear and pinion, manufactured by Spicer for the Studebaker "Weasel" Amphibian.*

THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET NEW YORK 5, N.Y.

As the EDITOR VIEWS the NEWS

A Better Way

One objective of Secretary of Commerce Henry Wallace, in his effort to make the Department of Commerce as popular as it was under Herbert Hoover, is to serve small business through regional offices from which advisors will assist businessmen in the way county agricultural agents assist farmers.

Probably the secretary came to this idea through sincere motives. The county agent has become an accepted institution in rural life. At first glance it may seem logical to assume that a similar agent to serve businessmen would achieve an equally good record.

Is this assumption sound? The question deserves careful study. In the first place the system of agricultural agents has expanded according to demand and to its ability to render service. Its major growth occurred when government was spending money frugally and when federal agencies had to win their way on merit. The proposed service to businessmen is proposed at a time when government is spending money recklessly and when services to the people are considered not on the basis of public demand, but on the basis of what the administration chooses to foist upon the people.

Whereas the county agent system had to prove its worth, the regional business advisory service would be launched as a full-blown bureau through administration initiative on the now prevalent assumption that Washington, like mother, knows what is best.

A second point is the difference between agricultural and business problems. There are a half-dozen types of agricultural enterprises to every 100 of industrial and commercial enterprises. To render a service to businessmen comparable to that rendered farmers would require a larger staff and greater variety of specialists. The cost of an adequate service might prove to be prohibitive. Also, much of the service contemplated would be an inferior duplication of work already being done capably by privately financed trade and technical associations.

A third point is the emphasis placed by Secretary Wallace upon the importance of helping "small business." The plight of small business has been greatly intensified by the administration's price, profit and wage policies. Mr. Wallace favors these policies. In offering to help the small operator through the Department of Commerce is he not proposing a new bureaucracy to act as an antidote for the ills committed by a dozen existing bureaucracies?

Before adopting the Wallace idea, it might be well to see if correcting Washington policies that hurt small business isn't a simpler and better way of "helping" the small operator.

STEEL
May 6, 1946

EXPORTING SKILL: Last year two groups of young Chinese were brought here for training in iron and steel production techniques. One group was originally sponsored by the Foreign Economic Administration. The second was brought here by the National Resources Commission of China. Training, arranged by the International Training Administration, was provided by various steel companies.

How and when the skills acquired by these youths will be utilized is not yet clear. China has little steelmaking capacity and most of this is in Manchuria where the plants reportedly have been stripped by the Russians. China, however, has plans for substantial enlargement of her steel industry. Preliminary plans call for establishment of three small plants with total capacity of 900,000 tons of ingots. Undoubtedly the American-trained Chinese youths will have much to offer in helping bring their country's industrial expansion plans to fruition.

There are some people in this country who frown upon the "export" of our industrial knowledge,

(OVER)

seeing in it a competitive threat to our future foreign trade. Such threat, in some degree, undoubtedly is present. On the other hand, isn't it just as logical to reason that, in the long run, this "export" of brains will pay dividends by contributing to a better understanding among the peoples of the earth, not to say anything of the values to come through elevation of the world standard of living? —pp. 106, 118

• • •

ABNORMAL YEAR: Net income before dividends of the iron and steel industry, as reflected in STEEL's annual financial analysis, declined for the fourth consecutive year in 1945.

Twenty-six ingot producers, representing 87.88 per cent of capacity, reported net aggregate income of $172,245,551 compared with $174,228,680 in 1944.

Considering the unusual economic conditions prevailing especially in the latter part of the year as the industry struggled to reconvert to peacetime production, the relatively poor financial showing is not surprising.

In addition to the carryback, carry-forward provisions of the revenue act, such factors as renegotiation, reductions in reserve for contingencies and accelerated depreciation served to create statistical cross-currents which make satisfactory comparisons with previous years difficult, if not impractical. Similar factors will figure prominently in 1946. The year 1945 was not a normal year and neither will be 1946 though we are at peace. —p. 130

• • •

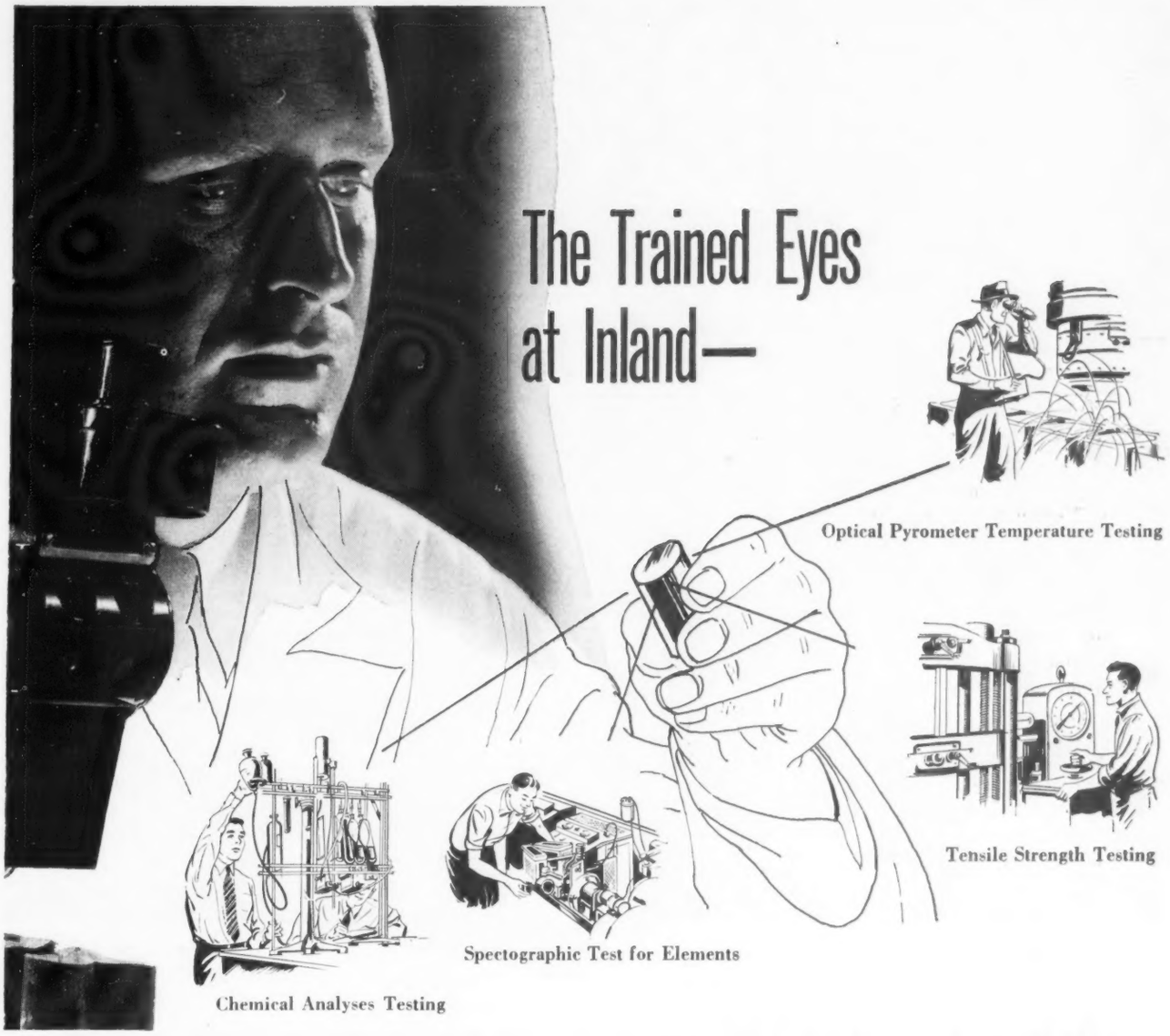
TOOL TALK: For machine tool engineers and designers, the week and a half which began Apr. 8 was packed with events of extraordinary interest. Concentrated into that short period were the New Era Exposition and annual meeting of the American Society of Tool Engineers in Cleveland, the Machine Tool Electrification Forum held under Westinghouse auspices at Pittsburgh, and the spring meeting of the National Machine Tool Builders' Association in Atlantic City.

These meetings had the special virtue of timeliness, coming as they did at a point in industrial reconversion programs where new tools, equipment, materials and techniques, described and exhibited, could be incorporated in the planning. Through exposition of his work, they also proved again the value of the tool engineer, so aptly dubbed "the incubator of the mass production urge." Upon him rests the responsibility for providing the metalworking trades with the kind of tools that will enable them to turn out continually improved products at reasonable prices in the face of constantly rising wages. —p. 158

SIGNS OF THE TIMES: Next major goal of steelworkers throughout the world is guaranteed work or guaranteed wages. This was made evident at the recent conference in Cleveland (p. 105) of the Iron & Steel Committee of the International Labor Organization. Delegates, representing employers, workers and governments of 12 leading steel producing nations, approved a series of resolutions endorsing principle of full employment and providing for further explorations on how it might be achieved. . . . Paralyzing effect of the bituminous coal miners' strike, now in its sixth week, is beginning to show up at an alarming pace. Steelmaking operations are going down rapidly (p. 108) as coal piles shrink. Unless the strike ends promptly, industry and essential public services will come to a halt within next few weeks. . . . Earnings of leading steel producing companies for first quarter of 1946 reflect adverse effects of the steel strike in January and February. However, one company which was not hampered by work stoppage (p. 111) reported its showing one of the best in its history. . . . Office of Price Administration has entered a protest with the Interstate Commerce Commission against the freight rate increase proposal made by the railroads, stating (p. 118) addition of at least a billion dollars to the nation's freight bill at this time would create a serious hazard to the government's effort to achieve economic stability. . . . Alfred P. Sloan Jr., commenting on the recent General Motors strike, says each issue involved a challenge which has been met (p. 122) and holds that if demands made on GM had been granted such would have resulted in an impractical pattern for management-labor relationships, and would be a deeply significant step toward socialization of American industry. . . . West Coast industrialists are of opinion (p. 132) congressional easing of price control may set in motion a flurry of industrial expansion held in abeyance until a more propitious time. Plans for 92 new plants to cost $6,518,000, as well as 66 additions to existing plants were filed during March in northern California. . . . Experimental gas turbine (p. 134) developed by Navy and Allis-Chalmers engineers recently completed a series of successful test runs at 1350 degrees Fahrenheit. Is regarded by engineers as a "fourth prime mover," having characteristics applicable for both land and marine use. . . . Special method used for preparing aluminum for electroplating (p. 142) uses, as a bonding layer, an immersion coating of zinc.

E. C. Shane

EDITOR-IN-CHIEF



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RYERSON STEEL

Delegates to the first meeting of the Iron & Steel Committee of the International Labor Organization in Cleveland pause for a photograph in the midst of the final day's session at which resolutions on full employment, annual wage plans, steel purchasing policies, technological displacement of workers, collective bargaining and other matters were approved

World's Steelworkers Aim Toward Guaranteed Employment, Wages

Delegates to International Labor Organization conference emphasize necessity for stabilizing jobs and income. Ask study of effect of steel consumers' purchasing policies on fluctuations in operations. American strikes amaze foreign representatives

GUARANTEED work or guaranteed wages will be the next major goal of steelworkers, not only in the United States but all over the world.

This was made clear by labor delegates to the first meeting of the Iron & Steel Committee of the International Labor Organization in Cleveland Apr. 23-29.

The conference, which included representatives of employers, workers and governments of 12 leading steelmaking nations, approved resolutions endorsing the principle of full employment and providing for further explorations on how it might be achieved.

The conferees also devoted considerable time to discussion of how to minimize the impact of technological displacements, on the rehabilitation of iron and steel industries in war-ravaged countries, on the development of underdeveloped countries, on the making available of more adequate statistics of world steel production, employment and other matters, on improving safety techniques and on collective bargaining.

While action was taken providing for further exploration of all these matters, the consensus of delegates was that the greatest values resulting from the meeting were the exchange of ideas and experiences and airing of common problems.

The meeting drew many top-ranking industrialists, labor leaders and government representatives of the major steel producers, excepting Russia and defeated Axis countries. Among the foreign employers representatives were: Geoffrey Summers, director, J. Summers & Sons Ltd., and chairman of the Joint Labor Conciliation Board for the British Sheet Steel Industry; R. Mather, chairman of Skinningrove Iron Co. Ltd.; Sir Lewis Jones, secretary of the South Wales Siemens Steel Association; K. A. D. Naoroji, president of Tata Inc., representing the Tata Iron & Steel Co. Ltd. of India; Baron Jean Seilliere, director general of the Societe Senelle Maubenge of France; Jacques de Nervo, president of the Societe Denain Auzin of France; Gustat Rudenstam, member of the Employers' Iron & Steel Association of Sweden; Sven L. Wahlstrom, director of the Hellefors Steel Co. of Sweden. United States employer delegates included John A. Stephens, vice president, United States Steel Corp; C. H. Murray, assistant to the president, American Rolling Mill Co., Middletown, O.; Joseph A. Voss, director of industrial relations, Republic Steel Corp., Cleveland.

Top labor union leaders were present from every country participating in the conference.

The meeting was primarily a labor show and it quickly became apparent that the first aims of the worker delegates was the assurance of a high and sustained employment and a greater voice in determining the economic life of their countries. This was just as apparent in the utterances of the older and more mature labor leaders of the United Kingdom and Sweden as in those of the more youthful and vigorous

leaders of the United States and some other countries.

Delegates from the United Kingdom and other foreign countries, however, expressed amazement at the strike tactics of American unions. They could not understand the coal strike in which the issues appeared to be undefined and where negotiations were being attempted while the workers were idle and before they had presented specific demands. They shook their heads when the month-long steel strike was mentioned. They indicated their belief that the issues in these work stoppages would have been handled far better in their countries and that the negotiations would have been between workers and employers, without the government interfering as a third party. A. Callighan, general secretary of the British blast furnacemen's union, proudly announced that the union he has headed for 27 years never has been involved in a work stoppage and that no dispute between workers and employers has ever reached the point of arbitration.

The British delegation was specially chagrined to find the hotel at which they were quartered was being struck. British delegates were forced to cross picket lines, walk up stairs, make their own beds and hunt for eating places outside the hotel.

The turbulence of American labor-management relations, several foreign delegates thought, must be due to the comparative youth of the United States unions and to American government labor policies.

Full Employment Discussed

The demand of worker delegates for guaranteed work or wages was emphasized in the speeches of many labor representatives. Andre Renard, president of the Metal Workers' Federation of Belgium, told the conference that the fundamental question of workers in his country was whether steelworkers were to enjoy full employment in peacetime or only during those periods in which preparations were being made for war. A high and sustained level of employment during peacetime, opined M. Renard, would contribute greatly toward lasting peace.

M. Renard also asserted that workers must receive a share in management, since factories are not a "separate domain" of their way of life. "I am not raising the question of private property," he added. "I accept that if it is not abusive and does not exploit the workers."

David J. McDonald, secretary-treasurer of the United Steelworkers of America-CIO, declared "it is inevitable that a guaranteed annual wage would be the right of steelworkers in the United States and, I hope, throughout the world."

Delegates to the ILO Iron & Steel Committee meeting take time out from their deliberations to visit the plants of Republic Steel Corp. at Cleveland. They are shown above inspecting the wide strip mill. Left to right: J. R. Van Syckle, safety supervisor, Cleveland district, Republic Steel; Mlle. Thomas, interpreter on the ILO staff; Henri Lorang, French labor delegate, Jacques de Nervo, president, Societe Denain Auzin, French employer delegate; Maurice Borgeaud, French government delegate, A. C. Bureau, French government delegate; Baron Jean Seilliere, general manager, Societe Senelle Maubenge, French employer delegate; A. Callighan, general secretary, Blast Furnacemen's Union, English labor delegate

Labor delegates of other countries expressed substantially similar views and the worker representatives as a whole proposed a series of resolutions on full employment and guaranteed wages, which, with some modifications, were approved by the full committee.

The full employment resolution read in part: "The Iron & Steel Committee . . .emphasizes the necessity of achieving a high and sustained level of employment in all industries. The committee recognizes that the achievement of this objective by the iron and steel industry is dependent on a high and sustained level of employment throughout industry generally.

"The committee declares its willingness to co-operate with the ILO and with the governments of the various countries in obtaining full factual information as a basis for the formulation of constructive plans and programs designed to bring about full and regular employment in the iron and steel industry, as far as is possible within the limitations under which the industry must operate."

The workers also proposed a resolution that it would be desirable for the iron and steel industry to accept the principle of guaranteed work or wages, and suggested that an inquiry be made by the ILO into schemes already in operation to provide such a result.

Employer members took the view that the results of the inquiry should be made known before the committee committed itself to the principle. The resolution as passed provided: "In pursuance of the policy of full employment, and as a means of abolishing underemployment. . .the committee. . .invites the ILO to make available the results of studies now in progress in the United States under the auspices of the Office of War Mobilization & Reconversion and to conduct similar inquiries into the methods and results of such annual and other wage schemes as may have been introduced in other countries."

A study of the purchasing policies of the large steel consumers to ascertain to what extent such policies influence the fluctuations in operations and employment and what revisions in such policies would contribute toward the regularization of employment also was asked by the committee.

Displacement of iron and steelworkers due to technological innovations came in for considerable discussion during the sessions. Clinton Golden, assistant to the president of the United Steelworkers of America, expressed the fear that widespread expansion of facilities and the introduction of new equipment might cause painful dislocations among steelworkers.

The United States industry, he pointed out, is planning to spend $327 million on new equipment this year, largely for new finishing facilities to balance the war expansion in melting capacity. While he feared no displacement im-

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U. S. Steel Bids $47.5 Million for Geneva Steel; Kaiser Makes No Offer

Six other bids received for government-owned Utah property. Corporation says it would spend $18.6 million for new facilities at Geneva, plus $25 million for cold reduction mill at Pittsburg, Calif. Two offers received for South Chicago plant

WAR ASSETS Administration last week received a bid from the United States Steel Corp. of $47,500,000 cash for the government-owned steel plant at Geneva, Utah, when bids were opened for sale or lease of this plant and the government-owned steel plant at South Chicago.

Total of seven bids were received for Geneva. The Kaiser Co., Oakland, Calif., after requesting postponement of bid openings to May 1 advised the WAA it was not bidding on either the Geneva or the South Chicago plants. Regarding Geneva, Mr. Kaiser wrote he felt this plant has "great potentialities" but explained that existing disadvantageous RFC loans resulted in his inability to submit a bid. He expressed the hope the government would be successful in obtaining an operator for Geneva, explaining he believed there was great demand for its products to meet growing western industry needs.

Referring to South Chicago, Mr. Kaiser said he was primarily interested in sheet metal production to meet sharp demand from the auto industry while the South Chicago plant was set up for gun barrel ingots.

Colorado Fuel Would Lease Plant

The Colorado Fuel & Iron Corp., Denver, offered to lease the Geneva plant through a new corporation to be established by the Colorado company with working capital of approximately $25 million contingent on installation of sheet, tin plate and other production facilities. The lease would be on a rental basis of $2 per ton of finished steel for not less than 15 years, with purchase option on an assured price of not less than $80 million to the government.

Benjamin F. Fairless, president, U. S. Steel Corp., explaining his company's offer, wrote that the corporation besides the purchase price, would further undertake to spend not less than $18,600,000 additional of its own funds for the installation of new facilities at Geneva for peacetime operations. Improved equipment would enable production of 386,000 tons of hot rolled coils for cold-reduced sheets and tin plate, and would involve erection of a modern cold reduction mill by Columbia Steel Co., U. S. Steel subsidiary at Pittsburg, Calif., at an estimated cost of $25 million. Total U. S. Steel commitment would be thus $91,100,000, Mr Fairless said.

W. A. Hauck, chief, Iron & Steel Section, WAA, stated no final award will be made until the proposals are analyzed, recommendations made to the Price Review Board, and approval given by the Department of Justice.

Mr. Hauck presented other bids for Geneva: J. S. Warshaw, New York, purchase at two-thirds of plant value, or lease at 100 per cent of plant value, or thirdly, joint operation with government; Riley Steel Co., Los Angeles, purchase bid of $135 million based on 750,000 ton production, or with various other charges, a total bid of $222,607,840; Pacific American Steel & Iron Corp., Seattle, bid of $40,498,642, based on plant cost of $202,493,208, involving a loan of $25 million for purchase of tin plate mill and other facilities; also bids from Assets Reconstruction Corp., Los Angeles, and Blue Star Enterprise Inc., Salt Lake City, Utah.

Bidding for the South Chicago plant were Central Steel Tube Co., Clinton, Iowa, offering to form a corporation to purchase the plant for $17,500,000; and Republic Steel, Cleveland, builder and operator of the plant. Republic offered to rent the plant for a minimum of $200,000 yearly.

Present, Past and Pending

■ BOLT, NUT, SCREW, RIVET RESALE PRICES INCREASED
WASHINGTON—Increases on all resales of bolts, nuts, screws and rivets have been authorized by the Office of Price Administration, effective May 6, to absorb the Apr. 1 increase of 7 per cent on producers' sales.

■ BUICK ACQUIRES MILLION SQUARE FEET MORE SPACE
DETROIT—Buick Motor Division, General Motors Corp., has acquired more than 1 million square feet of additional floor space through lease and purchase of government buildings in the greatest expansion program in the company's history.

■ INGALLS IRON GETS FRENCH CONTRACT FOR 25 BARGES
BIRMINGHAM—Ingalls Iron Works Co.'s Decatur, Ala., plant has been awarded a contract by France for 25 self-propelled diesel barges. Order is subject to receipt of steel and other materials.

■ ALL BUILDING STEEL REQUIRES SPECIAL EXPORT PERMITS
WASHINGTON—Special permits now will be necessary to export structural shapes and all other building steel, such as elevator guide rails, steel door frames, etc., Office of International Trade ruled last week.

■ OLIVER CORP. SLASHES YEAR'S PRODUCTION ESTIMATE
CHICAGO—Oliver Corp. has cut its estimate of its farm machinery and equipment production for the year ending Oct. 31 to $40 million from an estimate of $60 million made last fall and output may go lower.

■ AMERICAN ROLLING MILL BORROWS $40 MILLION
MIDDLETOWN, O.—American Rolling Mill Co. has concluded negotiations to borrow $40 million from the Equitable Life Assurance Society of the United States at 2.75 per cent interest rate and is to be amortized over a 20-year period. Proceeds will be used to pay off $15,500,000 in bank loans and to retire $25 million of preferred stock.

■ BRASS MILL PRODUCTS PRICES ADVANCED 1.3c A POUND
WASHINGTON—Ceiling prices for producers' sales of brass mill products increased an average of 1.3 cents a pound, effective May 1. Prices had been increased an average of about 1.5 cents a pound on Apr. 1.

■ FORECASTS CONTINUED HEAVY MACHINE TOOL BUSINESS
CINCINNATI—Machine tool business in the next four or five years will hold above prewar levels, according to W. L. Dolle, president, Lodge & Shipley Machine Tool Co.

■ STEEL MANUFACTURERS ASSOCIATION DISSOLVED
PITTSBURGH—Steel Manufacturers Association organized here in February, 1944, with membership of about 50 flat-rolled steel producers was dissolved May 1.

■ CROSLEY TO MAKE FIRST 1946 SHIPMENT THIS MONTH
CINCINNATI—First shipments of the new Crosley automobile will be made this month from the Marion, Ind., plant, the May quota being 100.

Edward F. McGrady, left, former assistant secretary of labor and a vice president of the Radio Corp. of America, entered the coal dispute picture last week as special mediator. Here he is shown in conference with, left to right: Ezra Van Horn, operators' spokesman; John T. Jones, secretary of the bituminous wage conference; and John L. Lewis, UMW chief

Fuel Shortage Reaching Crisis Stage

Ingot production cut further. Railroads' stocks running out. Utility companies order brownouts and other conservation measures. Metalworking plants initiate early vacation schedules. Lewis calls miners' policy committee to Washington

AN INDUSTRIAL crisis, direct result of the five-week coal strike, was shaping up at week's end. The fuel shortage, which already has caused a reduction of 25 points in the steel ingot operating rate and a loss of more than a million tons of steel, now is beginning to cut more deeply into operations of steel consuming industries, of transportation and of utility service.

In the face of apparently deadlocked negotiations, John L. Lewis, head of the miners' union, last week called the 250-member union policy committee to meet in Washington May 7. There was no immediate explanation for the move.

Meanwhile, the steel ingot operating rate dropped 5½ points to 64½ per cent of capacity and further reductions are scheduled for this week.

Steel producing units, with their short coal supplies running out like sand in an hourglass, in some cases are setting up vacation schedules now instead of waiting for summer. Sixty-two thousand workers already have been laid off and others are working reduced work-weeks.

Early vacation plans also are being adopted by some steel consuming industries, particularly foundries, which lack not only coal but also steel.

Railroads are curtailing service to conserve fuel supplies. While the carriers have an average of about 22 days' supply on hand, several major roads are down to less than a week's supply.

Utility companies, which were fairly well stocked when the strike started, are beginning to institute drastic conservation measures. Illinois Commerce Commission last week ordered closing down of all non-essential after-dark activities, limited supply of electricity to industrial plants to 24 hours a week, and ordered other brownout measures.

The order is expected to stretch existing coal supplies from 21 to 31 days.

Conservation Measures Necessary

Detroit Edison Co. has informed power users that the company's coal stocks have been depleted to a point where conservation measures are necessary. At present these will be confined to a wartime brownout, requests to industrial users to effect power savings and similar steps. Continuation of the coal strike might make further restrictions necessary by May 15.

Meanwhile, negotiations in the dispute dragged on in Washington. Early in the week, Secretary of Labor Lewis B. Schwellenbach called Edward F. McGrady, former assistant secretary of labor under Frances Perkins and one of the most experienced and popular mediators in the country, into the picture as a special mediator. Mr. McGrady now is vice president in charge of labor relations for the Radio Corp. of America.

In the leading steel centers of the country, the effects of the strike became more acute. At Chicago, where until last week Carnegie-Illinois Steel Corp. had been the only company to cut back production, Youngstown Sheet & Tube Co. and Inland Steel Co. each banked a blast furnace. District steelmaking dropped 4½ points to 66½ per cent of capacity. Operations of Chicago district metalworking plants also are being cut back because of lack of steel.

At Pittsburgh, United States Steel Corp. subsidiaries operated last week at 23 per cent of capacity. U. S. Steel currently is losing production of 21,000 tons of ingots daily in this district and at the end of last week figured the total loss in the Pittsburgh district at 615,000 tons.

Independent producers have maintained operations at a high rate and the majority will continue through this week. Next week, should the coal strike continue, will witness some sharp reductions.

U. S. Steel subsidiaries have maintained near capacity output of stainless steel, sheets and strip, tin plate and wire items to date, although the coal shortage has forced almost complete shutdown of other product mills. Sheet and wire production

will drop by the end of this week, tin plate output will be maintained through May 15.

Resumption of mining in some mines to supply coal for power plants, schools, hospitals, water works and other vitally needed utilities may be permitted by the United Mine Workers, according to John Dresmich, international representative. The emergency coal stockpile in the Pittsburgh district is down to 95,000 tons.

Perry Says Pittsburgh Is At Growing Disadvantage

Greater diversification of industry is necessary to offset growing local disadvantages in Pittsburgh's keystone steel industry, J. L. Perry, president, Carnegie-Illinois Steel Corp., stated last week speaking before the Institute of Community Problems of the University of Pittsburgh.

During the early years of the steel industry, when Pittsburgh was the only major steel producing area, a steel manufacturer located there was able to compete successfully in any part of the nation, he said. However, for several years "the density of consumption of steel has been moving away from Pittsburgh" and "as transportation costs rose—other centers of steel manufacture developed closer to the main growing centers of steel consumption," which, he said, "worked toward more and more restriction of the marketing areas in which Pittsburgh steel producers can compete advantageously."

Coal Stoppage Checks Rise in Post Steel Strike Production Upswing

Civilian Production Administrator Small reports March gains best since V-J Day. Warns full impact of coal strike yet to be felt. Says 3.5 million more tons of steel may be lost in May unless coal mining is resumed

AMERICAN industry in March made its biggest production gains since V-J Day, John D. Small, civilian production administrator, revealed in his monthly report, warning that April production will show the adverse effects of the soft coal strike.

Indications that reconversion in this country had started to pick up momentum fast following the end of the steel strike Feb. 20 and before it was checked by the coal strike included the following:

(1) Federal Reserve Board's index reached a postwar peak of 169, or 16 points above the reconversion low of 153 in February and one point above the previous postwar high recorded last November which included a significant volume of military production and plant reconversion.

(2) Construction activity continues to forge ahead despite materials shortages. The rise in activity from $524 million in February to $612 million in March was the largest ever recorded for the industry.

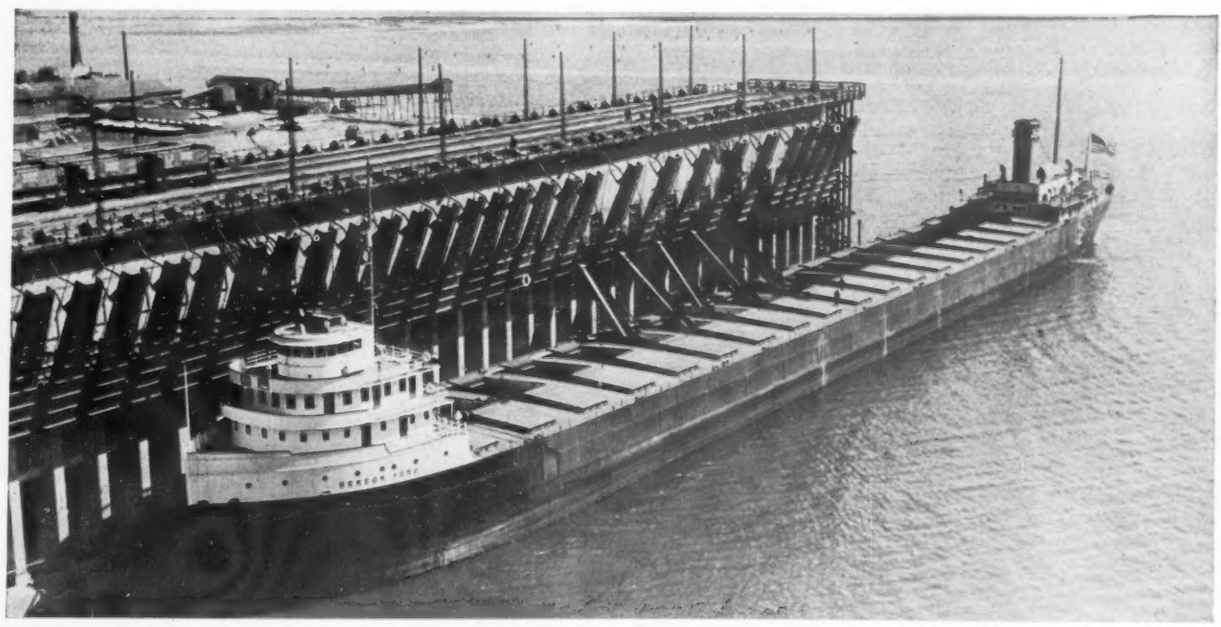
(3) From February to March the volume of civilian employment moved sharply upward for the first time since the end of the war.

(4) Indications are that consumer incomes in March were the highest of the reconversion period.

(5) Retail trade continued to expand through March and into the first two weeks of April, slightly bettering the normal seasonal movement.

(6) Office of Price Administration already has swung its priorities and allocations guns around and trained them on the Veteran's Emergency Housing Program with a view to blasting bottlenecks. In the first half of April, CPA approved 1469 applications for nonhousing construction totaling $142 million.

The picture in steel is very discouraging. As a result of the coal strike, more than 750,000 tons of steel ingots were lost during April and another 3.5 million tons probably will be lost in May, even if coal mining had been resumed May 1.



STEEP ROCK ORE: The steamer BENSON FORD is shown being loaded with the season's first shipment of iron ore from Steep Rock Mines Ltd., Rainy River district in northwestern Ontario. Tied up at the new 30,000-ton capacity dock at Port Arthur, the vessel took on 12,000 tons of high-quality blast furnace ore for the Ford Motor Co. furnaces at River Rouge, Mich. Total shipments of Steep Rock ore this season are expected to be 1,000,000 tons

U. S. Steel's First Quarter Net Income Below Like Period of 1945

Net earnings of $10,238,271 reported for first three months of 1946, but a loss of $13,594,746 would have been incurred had there not been created during the war years a fund to cover abnormal costs arising from the war

UNITED STATES Steel Corp., New York, last week reported that for the first quarter of 1946 it had a net income of $10,238,271, but that a loss of $13,594,746 would have been incurred had there not been created during the war years a fund to cover abnormal costs arising out of the war.

In the first quarter of 1945, net income was $15,379,171.

Because of the special fund, first quarter income in 1946 does not reflect any part of the cost of the steel strike, although there was a loss for tax purposes in the first quarter due to the strike. To prevent a possible distortion in operating figures for subsequent quarters of 1946, when operations may be more normal, the Steel corporation has deemed it advisable to consider estimated taxes for the full year so that each subsequent quarter may stand its proper tax cost in relation to its operating results. Therefore, a credit of $6,800,000 for income tax is reflected in the reported income for the first quarter.

The Steel corporation estimates that the steel strike cost it $27,887,000, although that figure does not consider loss of income due to inability to make shipments during the strike period.

Net Current Assets Increase

Net current assets of the corporation and its subsidiaries at Mar. 31, 1946, after deducting current dividend declarations, were $583,528,474, compared with $568,198,504 at Mar. 31, 1945.

Total capital expenditures during the first quarter of 1946, for additions to and betterments of fixed assets, were approximately $9,100,000.

Employment and payroll figures for the first quarter reflect effects of the steel strike. Average number of employees in the first quarter of 1946 was 261,101, compared with 293,077 in the corresponding quarter of last year, while payrolls in the first quarter of 1946 totaled $144,425,953, compared with $222,687,572 in the corresponding period of 1945.

Shipments of steel products in the first quarter, 1946, amounted to 2,718,864 net tons, compared with 5,001,245 net tons of finished steel shipped in the first quarter of 1945.

Production of steel ingots and castings in the first quarter of 1946 averaged 52.0 per cent of rated capacity.

Unfilled steel orders of the corporation amount to seven to eight months' production on the basis of the rate of approximately 85 per cent prevailing prior to the coal strike, Chairman Irving S. Olds declared at a press conference following the quarterly meeting of directors.

Up to the current time, he said, the coal strike had cost the Steel corporation 800,000 tons of ingots (and 2,500,000 tons of coal).

During the steel strike, he pointed out, the corporation was able to mine coal, but was not permitted by the strikers to store it at the steel plants for later use, and consequently had to sell its coal to outside interests.

Mr. Olds questioned the wisdom of leaders of the steelworkers union, even from their own standpoint, in refusing to let the corporation ship the coal to its own plants. Today, he said, more than 32,000 steelworkers in corporation plants are unemployed because of shortage of fuel, and the number will increase until the coal strike ends, and even then there will be a certain amount of unemployment for a while, pending a return to normal steelmaking operations.

As to how long that will be, much depends, he said, upon how much the corporation will have to curtail; if steelmaking does not have to be suspended entirely, operations can be returned to a "fairly high rate" within two to three weeks; if they do have to be suspended completely, it will take a relatively longer time.

Current ingot operations, Mr. Olds declared, were 45.5 per cent, with those in the Pittsburgh district down to 21 per cent and in the Chicago district, 45.4 per cent. In the preceding week the overall rate was 52.3 per cent.

Export business represented 4.9 per cent of total shipments, Mr. Olds said.

In reply to a question, he said he was not able to estimate accurately the cost to the corporation of the recent wage advance, particularly inasmuch as it involves advances in the cost of goods and services which the corporation buys. Whenever there is an advance by the Steel corporation, an advance invariably follows in numerous other directions and this all must be added to the bill. He said it might take several months before the corporation can accurately gage the real cost.

With reference to the proposed freight increase, Mr. Olds asserted that the freight chargeable to the Steel corporation last year amounted to $160 million, and that therefore the proposed increase would run into a large figure, but precisely how much he couldn't say. He pointed out, however, that the corporation was a carrier in its own right and therefore stood to benefit to a certain extent.

There was nothing new, he said, with respect to reports that the Steel corporation was planning to build a plant along the eastern seaboard. The matter has been under consideration for the past 15 years, Mr. Olds asserted; apparently it is as indefinite as ever.

Republic Steel Reports First Quarter Loss

Republic Steel Corp., Cleveland, last week reported consolidated net loss for the first quarter of 1946 of $347,412 compared with consolidated net income of $3,084,548 in the first quarter of 1945. Income in the first quarter 1946 was credited with a minimum tax credit of $1,815,000 and restoration from contingent reserves of $3,100,000 to cover approximate net excess charges in January and February 1946 due to steel strike.

Commenting on current business, T. M. Girdler, chairman, and C. M. White, president, stated orders on hand booked the company's production facilities at a high rate for many months to come.

"However," they said, "the current coal strike has already restricted our operations and if continued will have a very serious effect upon our rate of production."

American Rolling Mill's First Quarter Net Down

The American Rolling Mill Co., Middletown, O., last week reported consolidated net earnings for the first quarter of 1946 were $1,804,487 after all charges. This compares with consolidated net earnings for the first quarter 1945 of $1,875,502. Dividend of 25 cents per common share was declared.

Allegheny Ludlum Earnings Down in First Quarter

Allegheny Ludlum Steel Corp., Pittsburgh, last week reported operations for

the first quarter of 1946 resulted in net earnings of $252,043. This compares with $936,690 for the first quarter of 1945.

H. G. Batcheller, president, said earnings were adversely affected by the 29-day strike which closed most of the plants of the company early in the quarter.

Mr. Batcheller told stockholders that the tremendous public demand for goods can either lead to a false boom with subsequent crash, or be the means of building longtime industrial and employment security for the nation.

Increase Noted in Keystone Steel Company's Net Income

First quarter of 1946 was one of the most successful quarterly periods in the history of Keystone Steel & Wire Co., Peoria, Ill., the company announced.

Net profit for the three months ended Mar. 31, 1946, the third quarter of the company's fiscal year, totaled $528,901, compared with $336,492 in the corresponding period of 1945. For the nine months ended Mar. 31, net profit amounted to $1,351,370, compared with $1,123,946 in the like period of last year.

The company attributes its successful operation in the first quarter of 1946 to freedom from work stoppage during the nationwide steel strike in January and February.

Youngstown Sheet & Tube Profit Cut in Quarter

Youngstown Sheet & Tube Co., Youngstown, last week reported profit of $1,205,444 for the first quarter of 1946. This compares with 1945 first quarter profit which amouted to $1,888,549 after adjustment for accelerated amortization of emergency facilities.

The company, which was strikebound during the period Jan. 21 through Feb. 17, had strike expense of $1,571,590. Federal income taxes for the first quarter were $821,000 compared with $3,767,000 in the like 1945 period.

Jones & Laughlin Reports First Quarter Income Down

Net income of Jones & Laughlin Steel Corp., Pittsburgh, for the first quarter of 1946 was $813,246, compared with $2,013,489 in the corresponding period of last year. However, the effect of the steel strike in January and February of 1946 would have caused a loss to be shown for the first quarter if $4 million had not been transferred from reserve for contingencies to income account.

Grace Says Labor Relations Act Cause of Economic Disruptions

Speaking at press conference following quarterly meeting of Bethlehem directors, steel executive holds no relief in sight until basic labor legislation is amended. Steel strike cost Bethlehem $11 million in abnormal expense

POINTING to the cumulative effects of strikes this year on the steel industry, Eugene G. Grace, chairman, Bethlehem Steel Corp., stated in New York recently that the whole difficulty can be traced right back to the National Labor Relations Act and its administration. Until something is done with respect to this basic piece of labor legislation disruptions of the national economy are going to continue, he indicated.

He wondered what would happen if a steel company should decide to shut down a plant in these times of pressing demand, or any other time, to gain a point in a labor controversy. He answered this question by saying the government simply would not permit it to happen. Yet, he pointed out, some labor faction can close down an entire industry, whether in war or peace, and get away with it.

Speaking at a press conference following Bethlehem's quarterly meeting of directors, Mr. Grace said the steel strike alone cost Bethlehem $11 million for property damage, extra maintenance, abnormal administration expenditures, etc., for "just out-of-pocket expense and nothing else."

He recalled that at the beginning of this year the corporation had $135 million of uncompleted expansion authorized and that it had planned to spend $17 million against this program during the first quarter. What happened? he asked. "Because of paralyzing effects of strikes," he said, "we were able to spend no more than $6 million."

Mr. Grace predicted that if the coal strike were to continue, Bethlehem's steelmaking operations would fall well below 50 per cent by the middle of May.

Bethlehem still has considerable Navy work to finish, and there is substantial merchant ship repair and reconversion work coming out.

The corporation, Mr. Grace said, has been able to reduce its funded debt (as of Mar. 31) to $75,881,000, which compares with the peak of $237,150,000 in December, 1924. The previous low figure, he said, was $68,590,000, in December, 1916.

Reflecting the effects of the steel strike, Bethlehem's payroll in the first quarter was $83,215,210, compared with $101,650,192 in the preceding quarter. This figure, he added, also compared with $199,779,960 in the first period of 1945. Employees numbered 141,605, against 154,768 in the last quarter of 1945 and 237,370 in the first quarter of that year. Average hourly wage was $1.444 (reflecting rate increases), against $1.374 in the preceding quarter and $1.396 in the corresponding period of 1945; average weekly wages amounted to $45.70, against $49.98 and $65.45, respectively. Average work week was 31.7, compared with 36.4 in the preceding quarter.

Net income of $4,804,438 was reported for first quarter. This compares with $11,447,858 in the fourth quarter of last year and with $7,695,909 in the first quarter of 1945. In an explanatory note accompanying the quarterly statement, it is pointed out that because of extraordinary expenses incurred in the period which were charged to income, an amount of 11 million was transferred to income for the quarter from the contingent reserve which had been set up out of income in prior years. If such transfer had not been made, the income account for the quarter would have been shown a loss.

Mr. Grace in the annual report to employees points out that the $134,000,000 authorized for improved facilities is not the limit of Bethlehem's projects.

Specifically, new equipment for rolling stainless steel bars, expansion of capacity for making steel rolls, and diversification of facilities at the structural steel division at Bethlehem, Pa., are being studied.

The tool steel division at Bethlehem is being amplified, as are the wire, car shop and car wheel departments at Johnstown, Pa.

The bolt and nut operations at Lebanon, Pa., and wire rope facilities at Williamsport, Pa., are being extended, while at Steelton, Pa., various facilities are being added, including those for the end hardening of rails, and the fabrication of welded plate structures.

The Quincy, Mass., shipyard is being studied for the purpose of including some commercial shipbuilding at that point.

Impact of Steel Strike Shown in Production Data

Output and shipments of finished steel in first two months of 1946 down sharply from like period of last year

IMPACT of the steel strike in January and February is shown in the report by the American Iron & Steel Institute of finished steel production and shipments for these two months.

Total steel shipments for the period were 4,783,699 net tons, representing 42.3 per cent of capacity. This compares with 10,616,482 tons, 89.1 per cent of capacity in the comparable period in 1945.

All items showed a fairly even decline from last year. Heavy shapes dropped from 520,398 tons to 277,538 tons, plates from 1,501,480 tons to 371,097 tons, standard rails from 364,082 tons to 133,649 tons, total bars from 1,573,416 tons to 739,108 tons, drawn wire from 357,713 tons to 184,468 tons, tin plate from 444,993 tons to 266,934 tons, hot-rolled sheets from 1,057,457 tons to 527,389 tons and hot-rolled strip from 276,249 tons to 160,326 tons.

The institute also reported steel production for March at 6,507,047 net tons and for first quarter at 11,771,618 tons, including 10,745,550 tons of open-hearth ingots and 30,182 tons for castings; 597,366 tons of bessemer ingots; 380,281 tons of electric and crucible ingots and 18,239 tons of castings.

During March alloy steel production amounted to 402,685 tons of open-hearth and 128,491 tons of electric and crucible alloys. Hot topped carbon ingot production included 885,303 tons of open-hearth and 13,998 tons of electric and crucible.

Total alloy steel production in first quarter was 988,485 tons and of hot-topped carbon ingots 1,615,653 tons, according to the institute.

Pig iron production in March, as reported to the institute, totaled 4,384,057 net tons, with 39,859 tons of ferromanganese and spiegeleisen, a total of 4,423,916 tons.

For the first three months the total was 8,216,032 tons, compared with 14,735,552 tons in the like period in 1945.

AMERICAN IRON AND STEEL INSTITUTE
CAPACITY, PRODUCTION AND SHIPMENTS
Period: January and February, 1946

Steel Products	To Date This Year			
	Production		Shipments (Net Tons)	
	Net Tons	Per cent of capacity	Total	To members of the industry for conversion into further finished products
Ingots, blooms, billets, tube rounds, sheet and tin bars, etc.	x x x x	x x x	368,433	175,866
Structural shapes (heavy)	250,708	17.2	277,538	x x x x
Steel piling	11,451		9,311	x x x x
Plates (sheared and universal)	362,921	13.1	371,097	30,211
Skelp	x x x x	x x x	32,592	9,534
Rails—Standard (over 60 lbs.)	127,491	21.6	133,649	x x x x
—All other	16,799	26.5	15,310	x x x x
Splice bars and tie plates	51,998	18.4	56,395	x x x x
Track spikes	13,417	23.8	13,964	x x x x
Hot Rolled Bars—Carbon	603,837	x x x	521,045	67,948
—Reinforcing—New billet	72,425	x x x	86,406	x x x x
—Rerolled	13,753	x x x	14,021	x x x x
—Alloy	138,944	x x x	117,636	11,518
—TOTAL	828,959	23.4	739,108	79,466
Cold Finished Bars—Carbon	132,305	x x x	135,405	x x x x
—Alloy	21,735	x x x	18,723	x x x x
—TOTAL	154,040	33.5	154,128	x x x x
Tool steel bars	11,596	28.1	12,279	x x x x
Pipe & Tubes—Butt weld	116,840	33 2	126,000	x x x x
—Lap weld	19,545	16.6	28,025	x x x x
—Electric weld	79,104	30.9	71,271	x x x x
—Seamless	161,445	29.7	132,871	x x x x
—Conduit (cap. & prod. incl. above)	x x x x	x x x	9,184	x x x x
—Mech. tubing (cap. & prod. incl. above)	x x x x	x x x	33,364	x x x x
Wire rods	389,943	33.1	103,815	40,959
Wire—Drawn	313,969	34.0	184,468	11,867
—Nails and staples	51,329	25 2	50,862	x x x x
—Barbed and twisted	21,121	24.0	20,341	x x x x
—Woven wire fence	41,669	23.0	41,071	x x x x
—Bale ties	6,922	28.6	8,033	x x x x
Black Plate—Ordinary	x x x x	x x x	95,099	330
—Chemically treated	16,612	22.1	15,388	x x x x
Tin and Terne Plate—Hot dipped	152,749	25.1	182,474	x x x x
—Electrolytic	69,871	19 4	84,460	x x x x
Sheets—Hot rolled	1,234,399	39.4	527,389	34,477
—Cold rolled	565,347	49.1	399,186	x x x x
—Galvanized	146,628	31.0	152,071	x x x x
Strip—Hot rolled	219,331	18.8	160,326	22,252
—Cold rolled	131,074	26.3	136,911	x x x x
Wheels (car, rolled steel)	23,635	46.3	23,969	x x x x
Axles	10,401	16.2	8,976	x x x x
All other	5,197	19.0	4,341	x x x x
TOTAL STEEL PRODUCTS	x x x x	x x x	4,783,699	404,962

March Pig Iron Output Back to Normal After Strike

Blast Furnace Capacity and Production—Net Tons
Month: March 1946

	Number of companies	Annual blast furnace capacity	Production							
			Pig Iron		Ferro manganese and spiegel		Total		Percent of capacity	
			Current month	Year to date	Current Month	Year to date	Current month	Year to date	Current month	Year to date
DISTRIBUTION BY DISTRICTS:										
Eastern	12	12,988,970	774,957	1,375,634	14,385	28,120	789,342	1,403,754	71.5	43.8
Pittsburgh-Youngstown	15	25,939,940	1,830,689	3,242,480	15,132	19,403	1,845,821	3,261,883	83.8	51.0
Cleveland-Detroit	7	6,557,500	460,106	883,424	-	-	460,106	883,424	82.6	54.6
Chicago	7	14,093,510	901,243	1,770,026	-	-	901,243	1,770,026	75.3	50.9
Southern	9	4,924,670	309,457	647,577	10,342	17,421	319,799	664,998	76.4	54.7
Western	5	2,836,000	107,605	231,947	-		107,605	231,947	44.7	33.2
TOTAL	36	67,340,590	4,384,057	8,151,088	39,859	64,944	4,423,916	8,216,032	77.3	49.5

Some Structurals Suspended from Price Control

Fabricated structural steel shapes, plates returned to free market May 1. Only small price rise expected

FABRICATED structural steel shapes and plates have been suspended from price control, effective May 1, Office of Price Administration announced last week. These fabricated products were formerly covered by the general maximum price regulation.

Some price increases over present levels are expected, OPA said, because fabricators of these products have incurred substantial increases in material and labor costs. However, it is not likely that excessive increases will result.

Diversion of manpower or materials from equally or more essential production is not likely. This is true of these products partially because of government limitations upon certain types of construction imposed as part of the housing program.

The products which have been suspended from price control are of the types in such structures as buildings, bridges, erected storage tanks and conveyor towers. Fabricated products and services covered by all other price regulations (Nos. 136, 159, 251, 581 or 591) remain under price control and are not affected by the price control suspension.

The administration burden of continued price control for structural steel shapes and plates, OPA explained, would outweigh its benefits to the stabilization program. The suspension will permit the price agency to maintain more effective control on goods more vital to the program.

OPA also pointed out that although the cost of fabricated plates and shapes makes up a substantial part of the initial cost of highway structures, industrial and commercial buildings and similar projects, the cost, when amortized, becomes relatively insignificant as a business expense. In residential construction, the cost of the products being suspended from control is relatively small and any increase will have little or no effect on the cost of living.

Action was taken by OPA by issuing amendment 16 to supplementary order 129 (Exemption and Suspension from Price Control of Machines, Parts, Industrial Equipment and Services).

GOVERNMENT CONTROL DIGEST

Weekly summaries of orders and regulations issued by reconversion agencies. Symbols refer to designations of the orders and official releases. Official texts may be obtained from the respective agencies

OFFICE OF PRICE ADMINISTRATION

Malleable Iron Castings: Ceiling prices for malleable iron castings increased average of 7 per cent. Increases, effective Apr. 26, follow: (1) Maximum prices of which were frozen at base period, Oct. 1-15, 1941, levels, 25 per cent; (2) maximum prices of which were formulated between Oct. 21, 1942, and Dec. 31, 1943, 14 per cent; (3) maximum prices of which were formulated between Jan. 1, 1944, and Dec. 31, 1944, and for castings for which producers chose to use their prebase period prices, 6 per cent; (4) maximum prices of which were formulated between Jan.1, 1945, and Dec. 31, 1945, 2 per cent. (MPR-241; OPA-T-4448)

Tools, Jigs, Fixtures, Molds and Patterns: Manufacturers of these items used in making general machines, parts and industrial equipment covered by the general machinery regulation are now permitted to compute maximum prices by using a pricing formula which is based on base period costs and in all cases to recover total costs. (MPR-136; OPA-T-4458)

Cast Iron Radiation: Ceiling prices on cast iron radiation for use in the home and in commercial and industrial buildings increased 37 per cent over October, 1941, prices. Manufacturers without established prices for October, 1941, must apply to national OPA for authorization to increase prices. This action, effective Apr. 30, covers: Convectors, convector radiators, baseboard radiators, bathroom radiators, radiators for blower and ventilator systems, radiator bushings; radiator plugs, nipples, brackets and pedestals; cast iron and steel radiator chaplets. (MPR-591; OPA-6431)

Sheathed Cable: Dollar-and-cent ceiling prices established, effective Apr. 30, for nonmetallic sheathed cable of both R and T types. This action increases ceiling prices for type R cable an average of about 11 per cent and makes compensating cuts in type T cable prices. (MPR-82; OPA-T-4446)

Metal Household Furniture: Manufacturers of metal household furniture granted an interim wage-price increase amounting to 2 per cent of 1941 prices, effective Apr. 29. The price increase factor now totals 7 per cent over 1941 prices. (MPR-188; OPA-T-4441)

Steel Shovels, Scoops, Spades: Manufacturers of steel shovels, scoops and spades granted an interim wage-price increase amounting to 9 per cent of their existing ceiling prices, effective Apr. 26. (MPR-188; OPA-6423)

Iron Ore: Sellers of iron ore produced in Minnesota, Wisconsin or Michigan may enter into adjustable pricing agreements with buyers until final action is taken by OPA on an industry request for an increase in prices of iron ore produced in these states. The action, effective Apr. 26, provides that iron ore produced in the Lake Superior district may be paid for at prices no higher than maximum prices in effect at the time of delivery. However, agreements may be entered into to adjust these prices after delivery to an amount not in excess of the maximum prices established by OPA in taking final action upon the pending request. (MPR-113; OPA-71311)

Structural Steel: Fabricated structural steel shapes and plates suspended from price control, effective May 1. (SO-129; OPA-T-4461)

Repair Parts for Consumer Goods: Ceiling prices of repair and replacement parts for specified consumer durable goods that have received reconversion prices granted same percentage increase as allowed for the finished article, effective April 30. This action covers repair and replacement parts for repriced domestic cooking and heating stoves, domestic washing and ironing machines, business and office machines, vacuum cleaners and attachments, and household mechanical refrigerators. It does not apply to the parts that go into the production of the articles. Manufacturers of the finished articles, who price their repair and replacement parts which they sell under the general maximum price regulation, are permitted to increase their prices on these articles regardless of whether they make the parts themselves or purchase them for resale. Manufacturers of parts who sell directly to wholesalers and retailers may increase the prices, even though they do not themselves make any of the completed articles. (GMPR; OPA-T-4460)

Washing, Ironing Machines: Manufacturers' ceiling prices for domestic washing and ironing machines increased 6.8 per cent, effective Apr. 30. (MPR-86; OPA-6447)

Exemptions: Following durable consumer goods have been exempted from price control, effective May 6: Automobile license plates; glassware, china or pottery that has been electroplated with precious metals; units of one or two of a kind of custom-built upholstered furniture; piano benches. (SO-126; OPA-6439)

Automobiles: Effective May 1, approval of maximum prices of passenger automobiles for special or limited use (specially modified and equipped at the buyer's request) now may be obtained from OPA by letter or may be considered approved if OPA does not act on the application within ten days after receipt of it in the following instances: (1) When new passenger automobiles are sold by a manufacturer direct to user or to purchaser outside the United States; (2) when a sale involves a total of less than 25 units that are to be resold through all resellers in this country and its possessions; (3) sales of units to be resold in a one-time sale to the United States government, a state or municipal government. Minor changes were also made in the regulation's provisions covering financing instalment sales and pricing by resellers. (MPR-594; OPA-T-4468)

Cleveland Cap Screw Gives 155 Workers Service Pins

J. W. Fribley, president, Cleveland Cap Screw Co., Cleveland, presented service pins to 155 employees at a dinner at the Cleveland Club April 30. Service records ranged from 5 to 25 years. Frederick C. Crawford, president, Thompson Products Inc., Cleveland, was toastmaster. Mr. Fribley and associates organized the Cleveland Cap Screw Co. 30 years ago. It now employs 400 workers.

Harbison-Walker Earnings Up in First Quarter

Harbison-Walker Refractories Co., Pittsburgh, reports net earnings, including subsidiaries, for the quarter ending March 31, estimated at $434,011. This compares with estimated net earnings of $405,500 in the first quarter of 1945.

Land-Grant Rates, Affording Lower Tariff on U.S. Shipments, Abolished

Special rates for government to end Oct. 1 under Public Law 256, sought by carriers, Interstate Commerce Commission and railroad unions for past decade. Will remove inequalities among shippers bidding for government business

ABOLITION of land-grant rates on the railroads Oct. 1, 1946, will relieve a situation which for many years past has been a cause of headaches for the railroads, the government and many shippers.

Elimination of these rates, following efforts over more than a decade by members of the Interstate Commerce Commission and other government spokesmen, and by the railroads and the railroad unions, is assured by the passage of Public Law 256, signed by President Truman Dec. 12, 1945.

The move is significant from a number of points of view. They were well summed up by Rep. Charles A. Halleck (Rep., Ind.) who stated in the well of the House while the bill was being debated:

"Elimination of the land-grant rates will place the government on the same footing with all of its citizens in bearing charges for the support of the nation's railroad system. Furthermore, it will remove the causes of unequal opportunities among shippers bidding for government business. And finally, the ends of justice will be met, for certainly the government of the United States does not desire to be put in the position of demanding that it be paid over and over again for land which has been paid for many times since the original grants were made."

Encouraged Railroad Construction

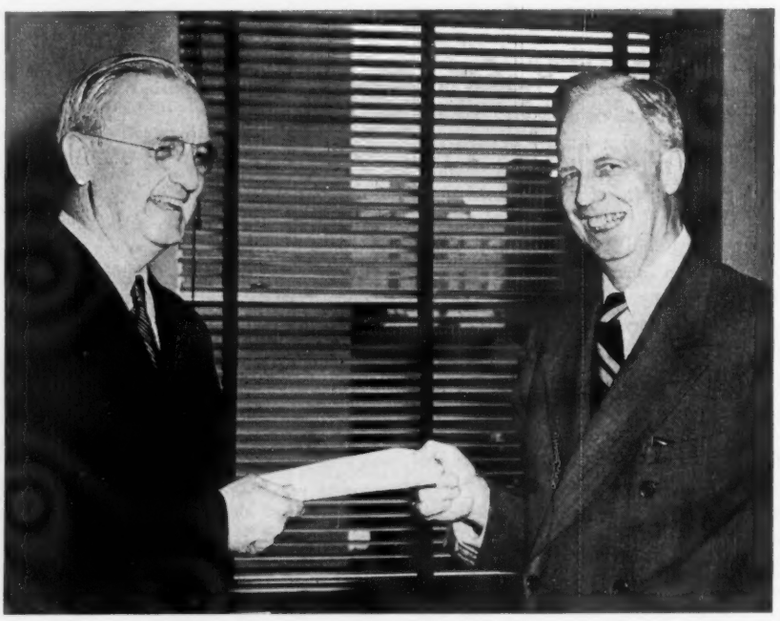
Land-grant rates have their origin in the land grants which Congress voted from 1850 to 1870 to encourage construction of railroads to open up the immense, then unpopulated, territory west of the Mississippi. These grants carried a stipulation that the government, using its own equipment, might haul government property over the lines after they had been built, and free of charge by the railroads.

This arrangement proved impractical, and about 1870 the railroads agreed to haul government goods over their lines, with their own equipment, at something less than the commercial rates. There resulted much confusion until in 1877 the Court of Claims decided that a fair charge upon the government for haulage of government property would be 50 per cent of the commercial rates. This decision was accepted by the railroads and has been in force ever since.

Of the approximately 240,000 miles of railroad in the United States only 14,441 miles are in the land-grant category. Actually, however, the land-grant rates affect practically all the railroads of the country. Under the government policy which provided that government shipments must be routed over lines taking the lowest net rates, circuitous routings gave a lot of trouble to the railroads. As a result the roads entered into an equalization agreement under which the shipments are sent over the usual short routes but at reduced rates when there is an alternative land-grant route, even though the latter routing might be much longer.

The Government Accounting Office, which is responsible for ascertaining the lowest rates which the government can use in shipping between various points all over the United States, has many maps showing both the direct routes and the alternate land-grant routes. A good example is afforded by a movement of government freight over the Southern Railroad, from Sheffield, Ala., to Corinth, Miss., a distance of 54 miles. The GAO map for this particular shipment shows that by moving this traffic, theoretically, from Sheffield to Birmingham, it could ship on land-grant lines from Birmingham to Meridian, Miss., and from Meridian up to Corinth, a total distance from Sheffield to Corinth of 484.82 miles by this theoretical routing. But 60 per cent of this 484.82 miles is over land-grant lines. So under the equalization agreement the Southern Railroad may charge the government only 60 per cent of the regular tariff when carrying government property 54 miles from Sheffield to the city of Corinth.

The GAO has a map showing that the direct route on the Frisco railroad from Kansas City, Mo., to Memphis, Tenn., is 473 miles. But the map shows an alternate land-grant route which runs 940 miles—from Kansas City to Galesburg, Ill., to Centralia, Ill., to Cairo, Ill., to Little Rock, Ark., and from Little



THANKS McCABE: Clarence Pickett, right, chairman of the executive committee of the American Council of Voluntary Agencies for Foreign Service Inc., presents Foreign Liquidation Commissioner Thomas B. McCabe with a letter of appreciation for FLC support in enabling his group to buy $7,750,000 in overseas surplus property. Fifty-eight relief and rehabilitation groups are represented by Mr. Pickett's agency. NEA photo

Rock to Memphis. So the Frisco hauls government property from Kansas City to Memphis at a reduction based on the percentage of land-grant miles in the alternate longer route.

There are hundreds of these maps, compiled by GAO men who have specialized in these studies, and who apply cost accounting methods in figuring land-grant rates so that they are not understandable to the average man. But they figure out to substantial savings to the government. Especially circuitous are the cross-continent routes which the GAO men map out to save the government money. For instance, the government gets a reduction of about two-fifths from the commercial rates on shipments from Richmond, Calif., to Charlotte, N. C., because, while the shortest route —and the one used by the railroads— is one of 3111 miles, the land-grant route is one of 5202 miles. The land-grant route would take the shipment from Richmond to Tacoma, Wash., to Superior, Wis., to LeMars, Iowa, to Cairo, Ill., to Corinth, Miss., and thence to Charlotte.

Competition Affected by Rates

Many interesting instances of how government use of land-grant rates affects competition were brought out during the hearings. One case involved steel products moving to Portland, Oreg., from Chicago in one instance and from Minnequa, Colo., in the other. The haul from Chicago to Portland is 2169 miles and the commercial rate is $1.10. The haul from Minnequa to Portland is 1306 miles and the commercial rate is 85 cents. But, on the basis of the land-grant mileage, the rate on steel products for the government is 56.010 cents from Chicago to Portland and 62.855 cents from Minnequa to Portland.

It was brought out that structural steel from St. Louis to Memphis, Tenn., takes commercial rate of 35 cents and, when shipped for the government, a land-grant rate of 30.911 cents. Structural steel from Chicago to Memphis takes a commercial rate of 42 cents but a land-grant rate of 27.723 cents. Thus, St. Louis, with a lower commercial rate, is at a disadvantage when it comes to shipments of government steel.

It was shown that steel from Markham, Ill., to Charleston, S. C., takes a commercial rate of 77 cents and a land-grant rate of 54.990 cents. Machinery and machine parts from Cleveland, to Brookley, Ala., take a commercial rate of $1.06 and a land-grant rate of 73.451 cents. Steel products from Cleveland to Charleston, S. C., take a commercial rate of 68 cents and a land-grant rate of 55.990 cents. The first-class commercial class rate from Chicago to St. Louis is 92 cents, whereas the net rate to the government after the land-grant deduction is 56.988 cents.

The above situation was modified somewhat by the Transportation Act of 1940 which provided that the reduced land-grant rates thereafter would apply only to shipments of military or naval property and personnel, and not to items of a civilian character. But a lot of confusion resulted from the contention of government officials that this stipulation should be construed broadly. The policy was one of counting as war materiel almost all government property that was shipped— as lend-lease goods, materials entering into the construction of merchant ships, candy bars for the soldiers, etc. As the matter now stands many of these questions are for the courts to decide and it is likely that large amounts of money at stake between the government and the railroads will be the subject of litigation for years to come.

Still other litigation is in process because of the land-grant rates. The important effect of the land grant reductions on railroad revenue led some roads to try to change the division of the burden as between the participating carriers. The situation is complicated by a ruling of the Comptroller General that government shipments through freight forwarders were subject to land-grant rate reductions.

There also are unsettled questions relating to goods hauled by motor carriers who were forced to carry government goods at lower than their normal rates because of the competition of the land-grant rates on the railroads. Numerous cases, cited by Rep. J. Percy Priest (Dem., Tenn.) during the House debate on the bill, showed a deduction of at least 37.5 per cent on movement of government freight on motor trucks during the war—the motor carriers, he said, felt that it was their duty to haul war materiel without delay and argue about the compensation later.

Rates Cause Discrimination

In the debate Rep. Clarence J. Brown (Rep., O.) pointed out the advantage to manufacturers or farmers in bidding for government business when they can base their bids on low-grant rates rather than on the commercial rates which must be paid when the competitors are located less fortunately. Representative Halleck went on to say that "these land-grant rates have set up discriminations between communities, and between manufacturers in different communities."

The land-grant rates prevented the railroads from reducing rates on steel from eastern territory when water shipments to the West Coast came to an end during the war, according to testimony by the late Joseph B. Eastman who, at the time, was serving as director of the Office of Defense Transportation.

"'Yes,' the railroads said, "according to Mr. Eastman, "'we would be willing to consider such a reduction if we knew what rates could be charged, but we cannot afford to cut our rates materially if we are going to have to move the traffic, under the land-grant reductions, at 50 per cent of whatever the published rate may be.'"

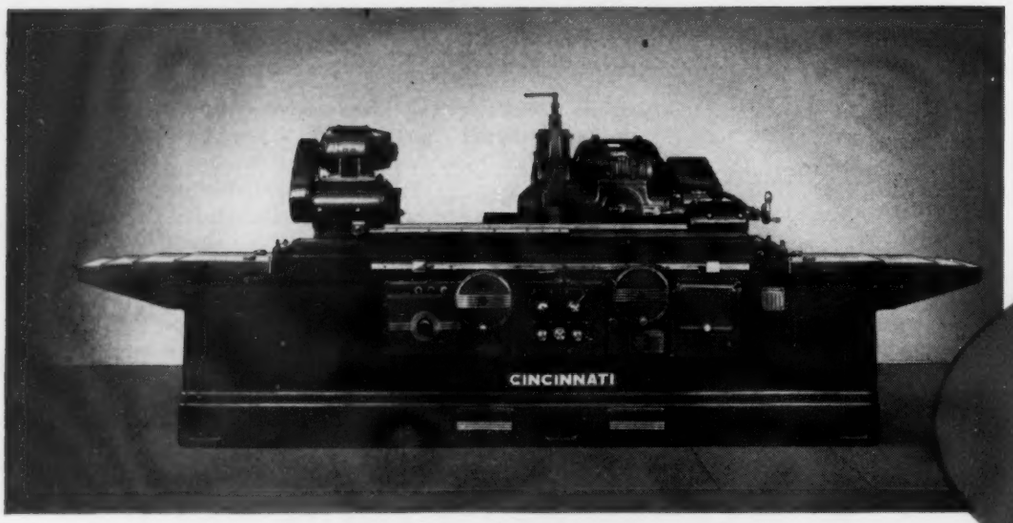
The government has reaped a huge profit from the land grants to the railroads. It was shown during the House hearings that 130 million acres were conveyed to the railroads during 1850-1870— worth $126 million, or about 97 cents an acre—on the basis of land values as of that time. For the first 50 years after 1877—when the land-grant rates were fixed at 50 per cent of the regular commercial rates—the average deduction for the freight hauled for the government was $1 million a year. During the 1930s, as a result of the vast relief programs of the government, the deduction for freight hauled for the government went as high in some years as $10 million per year. During 1942, 1943, 1944 it was in the neighborhood of $240 million a year due to the heavy shipments of war materiel and personnel.

Provision for Lower Rates Included

Public Law 256 has a provision under which the Interstate Commerce Commission would give lower rates to private shippers in the amount of any increases in railroad revenue because of the elimination of land-grant rates to the government. But this provision never was taken very seriously in the debate on the bill since it generally was realized that railroad costs were rising and the chances favored an increase rather than a reduction in rates after the war.

The only special rates on government shipments that may remain in effect after Public Law 256 becomes operative on Oct. 1, 1946, are those entered into by special agreement between the railroads and the government under the famous Section 22 of the Interstate Commerce Act. Altogether there were 252 of these agreements covering shipments of many products during the war.

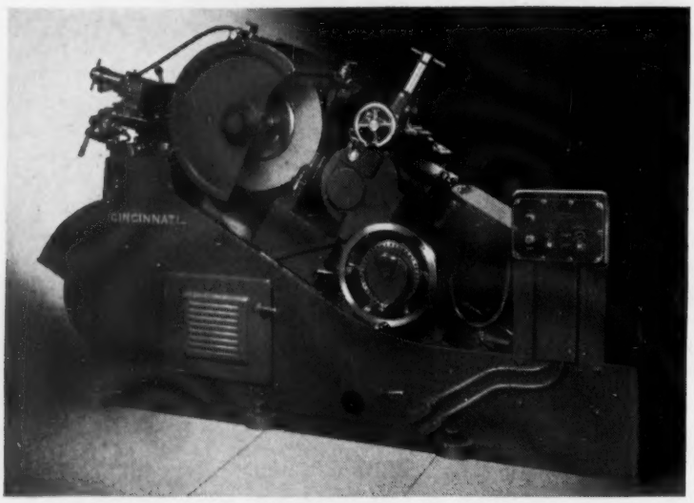
Most of the rates thus set under Section 22 will be of little importance now that the war is over. In general, therefore, the government after Oct. 1, will be paying the same railroad rates as all other shippers, and the special reduced freight rates which have helped some companies and communities in getting government contracts in the past will no longer be in existence.



CINCINNATI 10″ Plain Hydraulic Grinding Machine. Also available in 14″ L size. Between-center lengths, 18″, 36″, 48″, 72″ and 96″. Catalogs G-490-1 and G-533.

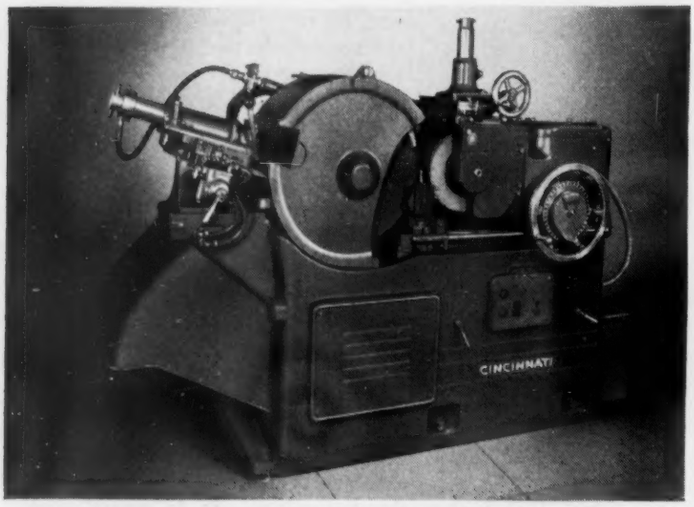
For your

CINCINNATI



CINCINNATI No. 4 Centerless Grinding Machine. Capacity up to 9″ diameter. Specification sheet G-3506.

CINCINNATI 6″ Plain Hydraulic Grinding Machine. Also available in 1 size and between-center lengths 18″ cnd 30″. Catalog G-537.



CINCINNATI No. 3 Centerless Grinding Machine. Capacity up to 6″ diameter. Catalog G-438-3.

CINCINNATI No. 2 Centerless Grinding Machine. Capacity 1/16″ to 3 diameter. Catalog G-456-3.

For a brief description of all Cincinnati Grinding and Lapping Machines, look in Sweet's Catalog File for Mechanical Industries.

CINCINNATI G

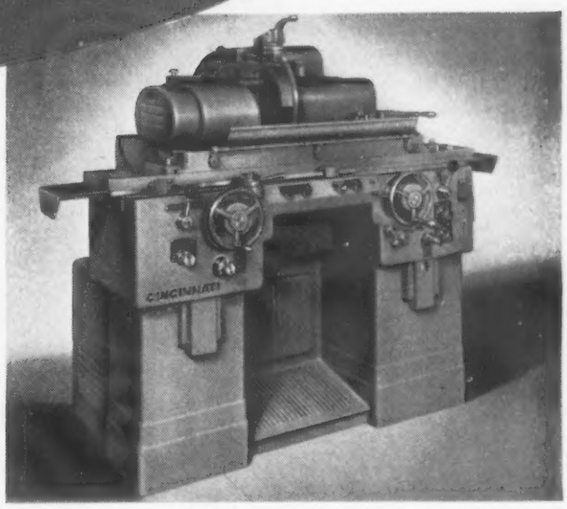
CENTER TYPE GRINDING MACHINES

PRECISION CYLINDRICAL GRINDING OPERATIONS

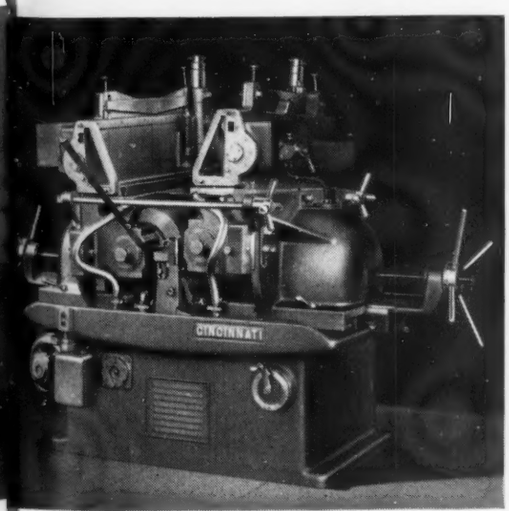
CINCINNATI'S Line of [illegible] Centertype and Centerless Grinding Machines and [illegible] Centerless Lapping Machine are shown on these two pages. A brief description, together with other important data on these machines, is contained in our recently published general Catalog No. M-1420. A copy will be sent on request. For more detailed information and complete specifications on any of these machines in which you are interested, we suggest you send for individual catalogs. When writing, please ask for catalogs by the numbers shown beneath the illustrations.

Turn to pages 4 and 5 of this issue of American Machinist for information on Milling, Broaching and Cutter Sharpening Machines.

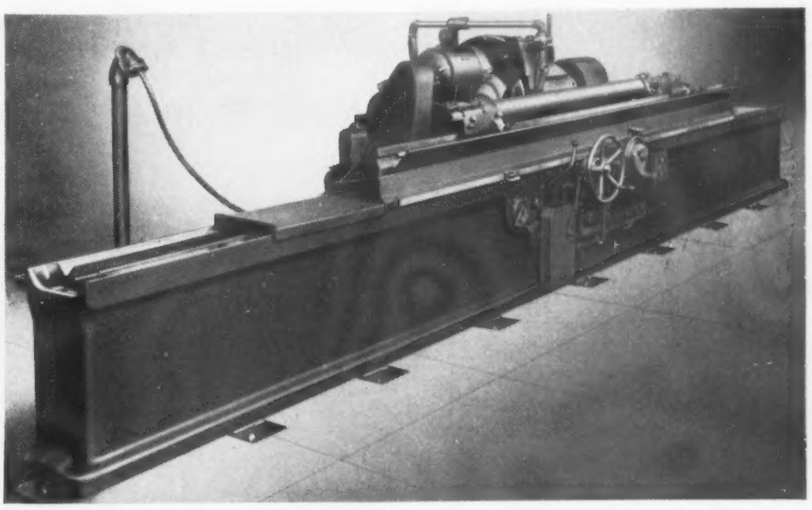
CINCINNATI 12″ Hydraulic Universal Grinding Machine. Also available in 14″, 16″ and 18″ [illegible], and between-center lengths 36″, 48″ and 72″. Catalogs G-486-3 and G-474-3.



CINCINNATI 4″ Plain Hydraulic Grinding Machine. Built in 12″ and 18″ lengths. Catalog G-520.



CINCINNATI Centerless Lapping Machine. Capacity ¼″ to [illegible]″ diameter, tolerances within .000005″.



CINCINNATI 14″ Plain Self-Contained Grinding Machine. Also available in 16″ size and between-center lengths from 36″ to 168″. Catalog G-491-2.

[illegible]TI GRINDERS INCORPORATED

CINCINNATI 9, OHIO, U. S. A.

[illegible]CHINES CENTERLESS GRINDING MACHINES • CENTERLESS LAPPING MACHINES

Chinese Completing Government Sponsored Course in Steelmaking

First of two groups of trainees brought to United States in 1945 scheduled to return to China in September. Second group will return home in 1947. Skills acquired in actual practice will be utilized in developing Chinese steel industry

FIRST of the two groups of young Chinese brought to the United States in September, 1945, for instruction in iron and steel production techniques is slated to return to China in September.

This group, numbering about 40, was sponsored originally by the Foreign Economic Administration and later by the Chinese national government.

The second group, numbering about 20, brought here by the National Resources Commission of China, will return in September of 1947.

Training courses for these young Chinese nationals were arranged by the International Training Administration, Washington. Companies doing most of the actual training include Copperweld Steel Co., Glassport, Pa., Great Lakes Steel Corp., Detroit, Inland Steel Co., Chicago, Jessop Steel Co., Washington, Pa., Jones & Laughlin Steel Corp., Pittsburgh, Kaiser Co. Inc., Oakland, Calif., Lukens Steel Co., Coatesville, Pa., Republic Steel Corp., Cleveland, Wheeling Steel Corp., Wheeling, W. Va., Timken Roller Bearing Co., Canton, O., Blaw-Knox Co., Pittsburgh, United Engineering & Foundry Co., Pittsburgh, Koppers Co. Inc., Pittsburgh, Vanadium-Alloys Steel Co., Latrobe, Pa., Pittsburgh Steel Co., Pittsburgh.

Just where and how soon these trainees will find jobs in China for which they are being trained depends on the formulation and execution of final plans for locating iron and steel capacity in China.

Much will depend on the report made by Arthur G. McKee & Co., Cleveland, recently retained by the Chinese national government to investigate iron and steelmaking possibilities. It also depends on the present state of the Japanese-built Showa Steel Works at Anshan, Manchuria, which is said to have been stripped of much of its equipment by the Russians; also, on whether this plant is directed in the future by Chinese communists.

The Showa works, as last reported, had capacity for production of about 2,000,000 tons of steel ingots annually.

Another possibility which has been mentioned lies in transfer of some iron and steelmaking facilities from Japan.

A preliminary plan of the Chinese National Resources Commission called for the establishment of three small plants—one at Tayeh, in Hupeh, with 450,000 tons ingot capacity annually, one at Peiping with 300,000 tons, and one at Suicheng, in Kweichow, with 150,000 tons.

OPA Opposes Proposal to Raise Rail Freight Rates

Stressing the inflationary dangers if a 25 per cent increase in freight rates were permitted to become effective May 15, the Office of Price Administration has filed a formal protest against the proposal with the Interstate Commerce Commission.

"Coming at what may well prove to be the decisive stage in the long battle against inflation, the railroads' petition for the addition of at least a billion dollars to the nation's freight bill creates a serious hazard for the government's efforts to achieve national economic stability," the protest states.

"The railroads' request for rate increases comes with an impact more than four times as great, in dollar terms, as the recent increase in basic steel ceilings.

"Moreover, the dislocating effect on industrial and commodity relationship of rate increases of this size, though incalculable, would inevitably be severe. Increases in the cost of living would be numerous. Even in an uncontrolled and stable economy, the shock would be dangerous. For an economy subject to the risk of an inflationary explosion, the consequence could be disastrous. And there is no need to demonstrate that the railroad industry, which has been a major beneficiary of price control, would be one of the principal sufferers from an inflationary boom and bust."

The protest recognizes that the railroad industry is entitled to have its claim considered fully and speedily, but "in view of the grave potentialities of the issue, the Price Administrator submits that the railroad industry's haste to obtain the benefit of the proposed rate increases without hearing by the Commission is wholly without warrant."

Patent Office Simplifies Application Procedures

Simplified regulations for patent applications have been adopted at the U. S. Patent Office, and will be put into effect in the near future.

An agency committee is studying present practices and procedure, to recommend any necessary revisions, although this will not extend to statutory changes that may be necessary, it was added. A departmental patent survey committee already is working on the latter matter.

Planning Association Develops Plan for Maintenance of Strong Aircraft Industry

AN INTEGRATED program for the future development of aviation and the maintenance of a strong aircraft industry is contained in a 68-page booklet issued by the National Planning Association. It is a result of a year's work by a committee headed by William A. M. Burden, assistant secretary of Commerce for Air.

To insure the ability of the aircraft industry to expand production to meet any future mobilization requirements, the committee points out, "it must be clearly understood that all measures will be fruitless unless the means exist for producing and fabricating such basic materials as aluminum, magnesium, rubber, steel and the like in rapidly increasing quantities that would be needed in an emergency. No disposal of the government's war plants or production equipment for such basic supply industries should be made without full prior provision for meeting the needs, in a future emergency, of the armed forces and of essential civilian industries."

The proposed program submitted by the committee includes the following recommendations:

A research and development program of the size and scope required to develop and produce continuously improved aircraft and to expand production to meet any future emergency requirements;

Establishment of a National Research Foundation to co-ordinate scientific research and education activities;

A military aircraft procurement program along the lines recommended by the Interdepartmental Committee for the Demobilization of the Aircraft Industry;

Air parcel post, and the dispatch of first-class mail by air without surcharge;

Encouragement of local intercommunity air transportation by subsidizing a limited number of local experimental services in each of the major areas of the country;

Removal of restrictions limiting commercial rights in international air commerce;

Promotion of unscheduled commercial and private flying through the provision of carefully planned and located airports and facilities, research and experimentation with respect to smaller types of airplanes, and research on improved methods of pilot selection and training, with proper participation by the Federal Government;

A Civilian Pilot Training Program for college-age youths to be undertaken by the Civil Aeronautics Administration;

Liberal policies with respect to licensing, for export and for manufacture abroad, of the latest and best designs, to the extent consistent with national security;

Federal assistance in making aeronautical training in this country available to nationals of friendly foreign countries;

Disposal of surplus aircraft and plants in such a way as to preserve the capacity of our permanent aircraft manufacturing industry for research, development, and production of aircraft and aeronautical devices of the most recent types.

British Steel Industry Working At Fast Pace To Meet Big Demand

Producers in various producing districts report heavy tonnage on books and anticipate substantial sales volume well into future. Unprecedented demand for sheets is reported. Semi-finished steel supplies inadequate

THE IRON and steel industry of the United Kingdom anticipates heavy demand and full operation throughout 1946, according to information from American sources abroad.

Midland firms are reported looking forward to an active market for light castings, and substantial sales volume in structural items, as well as cast iron domestic items. Foundries are able to absorb all pig iron, hence no exportation is expected, it was said.

An unprecedented demand for steel sheets, with orders assured at least until July, is reported. Rerollers are said to be in need of larger supplies of semi-finished steel, and expect to have to depend on imports from the dominions to meet the deficit. In particular demand, it is said, is steel for railway cars and locomotives, sections, bars, arches, light rails and other steels used in maintenance of mines.

Moderate activity is reported from Sheffield, the most active being plants producing materials for railways and shipyards. Firms making a higher quality of steels were reported not as busy, but manufacturers of high-speed steel are more active, the tool trade having placed orders months in advance. Hand-tool trades have work for 2 or 3 years, it is stated.

In the north of England, continues the report, the iron and steel industry began the year with orders on hand for a sustained high volume of trade. Many plants were reported operating at or near capacity, with light castings plants taking large supplies of high-phosphorous pig iron, and low-phosphorous output satisfactory in amount for engineering foundry requirements.

Finished iron producers report large orders, with production increasing. Manufacturers of heavy joists and channels are promising early deliveries.

However, the report adds, there is no basic iron in the open market in the north of England. Sheetmakers are fully sold over the first half of this year, with substantial orders being taken for later delivery. Materials in great demand are the same as in other parts of the country—materials for shipbuilding, railway construction and mines.

Scottish iron and steel plants have been at full speed for some time, with domestic requirements rising with progress in shipbuilding. Also making large demands on the industry are machine tool makers, engineering firms, and power plant construction. Sheetmakers are at full capacity; the tube trade is busy. Pig iron production is being maintained at normal levels. The light castings industry in Scotland is mostly attempting to meet material needs for housing.

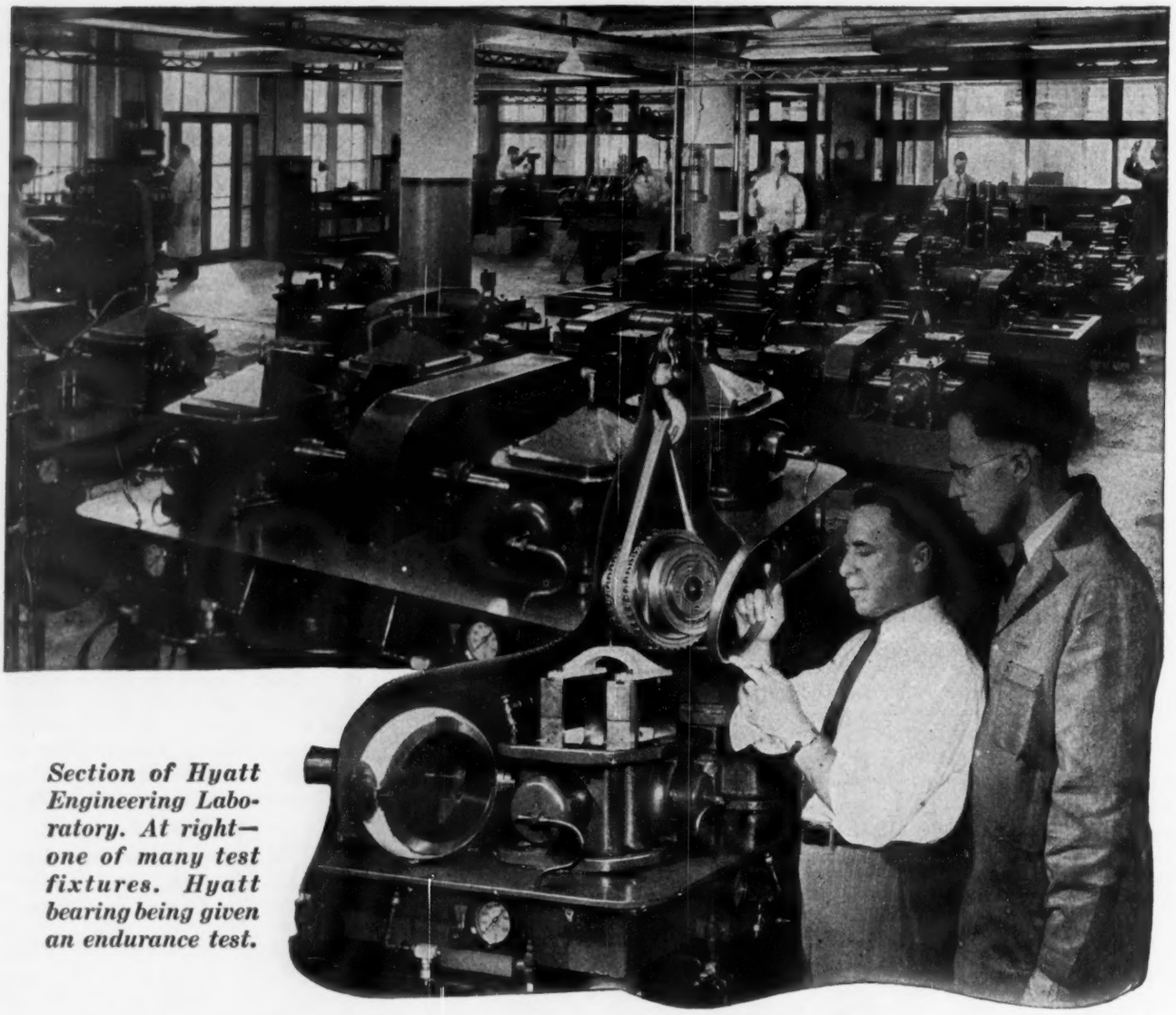
A tight labor situation is the principal factor limiting production, although fuel and materials shortages as well as transportation difficulties also are present.

TRACTORS FOR EXPORT: Roger M. Kyes, president of Harry Ferguson Inc., Detroit, drives a Ford-Ferguson tractor up the ramp of an airliner which will fly it to Guatemala

Abandoned Ships Supply England with Scrap

Abandoned ships are furnishing the steel industry of the United Kingdom with abundant scrap sufficient for at least 18 months, it is reported from that country by American sources. This is a change from prewar days, when the U. S. supplied a large tonnage of scrap.

There may be a rolling mill table... an ingot car, or a skip hoist in this room



Section of Hyatt Engineering Laboratory. At right—one of many test fixtures. Hyatt bearing being given an endurance test.

EACH DIFFERENT TYPE of application makes its own special demands of Hyatt Roller Bearings—with such destructive forces as speed, impact, radial or thrust loads, and others—as well as contending with conditions of moisture, heat, cold, dust, dirt.

It is traditional to build Hyatts with endurance to outlast the equipment for which they are designed.

Our way of making sure of their capacity to do so is to simulate the conditions of the job—whether it's that of a mill table, an ingot car, or a mill motor—in our 24-hour-a-day testing laboratory.

Here, dozens of individual tests go on all the time—even to running bearings to destruction to prove their correctness of design.

Any bearing, in any stage of production may be picked for these tests by Hyatt's roving test engineers. This random selection is added assurance to the Hyatt Roller Bearing user that both workmanship and metallurgical standards are adhered to throughout the entire manufacturing process.

Hyatt engineers gladly consult with you on the selection of the proper Hyatt Roller Bearings for your product. Hyatt Bearings Division, General Motors Corporation, Harrison, N.J.

HYATT ROLLER BEARINGS

mirrors of MOTORDOM

By A. H. ALLEN *Detroit Editor, STEEL*

Significance of new model automobile, 1946 Scarab, developed by W. B. Stout is its successful experimental application of new construction material. Basically car is identical with old model though numerous interesting refinements have been made

DETROIT

PROBABLY by now most of the world has been informed of the development by W. B. Stout of his 1946 Scarab model, since the formal unveiling last week at Dearborn Inn was well publicized, and the news story was released even before this to national publications. Significance of the development, however, is not so much a new model automobile as it is the successful experimental application of a new construction material—fiberglass-and-plastic.

A product of the Owens-Corning Fiberglass Corp., the material comprises about equal parts of woven fiberglass and thermoplastic compound, supplied in various forms which can be formed under heat and pressure to any desired contour, and subsequently "cured" to set them. The entire body of the 1946 Stout design is made of this material, with outer panels about $\frac{1}{16}$-in. thick. There is no separate frame to the car, the body structure being the frame. Exterior finish is comparable to that obtained on conventional cold-rolled steel, except for a slight waviness discernible at various points. It is applied in the usual way, by rubbing down the glass-and-plastic sheet and spraying with lacquer.

Basically, the car is identical with the old Scarab model built by Stout many years ago, embodying rear-mounted Ford V-8 engine, independent wheel suspension with air springs, movable seats in the interior, curved windshield and other innovations. By making the wheel suspension points about on a level with the window sills, the body is more or less "cradled" so that an exceptionally smooth, swerveless and bounceless ride results.

Stout makes no claims for his new body material except to point out what he has done with it and let the observer draw his own conclusions. Certainly the suppliers of sheet steel need have no immediate worries over possible competition, since the economic use of fiberglass will have to wait on further tests, lower cost, (now about 70 cents per pound), perfection of suitable mass production and fabrication techniques and a lot of other things. For example, weathering, prolonged exposure to extremes of heat and cold, rain, snow, sleet, dust and whatnot may prove more deteriorating than is the case with steel, although certainly there would be no rusting. Most plastics will not stand weathering very well, tending to wrinkle out of shape, crack and otherwise distort. The combination glass and plastic is said to have higher impact strength than steel sheet, with the glass fibers themselves having tensile strength on the order of 300,000 psi. Panels of the material cannot be dented by the most powerful swing of a hammer. They can be machined, drilled or ground, but require the use of carbide tools for cutting or drilling.

As with most of his other many ideas, Stout has no use for them once they come close to the production stage. As he says, he will build one experimental model, but as soon as someone starts talking three or four, he will turn the job over to outsiders.

The new Stout car, the designer emphasizes, is not a product of Kaiser-Frazer Corp. It was built largely by Owens-Corning at its Newark, O., plant, with final trim and upholstery handled in the Graham-Paige plant here. Graham-Paige now has full rights on the design, but may license other users. Graham-Paige, of course, is now considered part and parcel of Kaiser-Frazer, and Mr. Stout himself has been on loan to G-P from Consolidated Vultee Aircraft Corp. Initial development of the fiberglass material was for aircraft applications, with many perfected and in use. Just how this entire complicated picture fits together, and the ultimate determination of who is going to do what to whom and for how much remains for the future.

Numerous interesting refinements have been made in Stout's latest dreamchild. For example, doors are pushbutton controlled through an electromagnetic arrangement, inside control being on the large steering column housing. Front compartment, in addition to accommodating the spare tire, houses a thermostatically controlled heater which utilizes a gasoline burner and blower arrangement. Rear fenders may be unbolted and removed in a few seconds to service rear wheels and the engine compartment. Vision forward has been improved by moving corner posts back about one foot and curving the glass windshield to fit, requiring special windshield wipers to traverse a curved surface. Stout has driven the car about 500 miles in all and, as in his former Scarab model, can carry a full glass of water on the dash without spilling it.

Automobile Production

Passenger Cars and Trucks—U. S. and Canada

Tabulated by Ward's Automotive Reports

	1946	1941
January	121,861	524,073
February	83,841	509,332
March	140,777°	533,878
April	245,000°	489,856
Week ended:		
April 13	49,425°	99,260
April 20	57,565°	99,945
April 27	64,620°	108,165
May 4	70,000°	130,610

°Preliminary estimate.

New Officers Elected at Ford

Annual meeting of the Ford board of directors on Apr. 22 saw the selection of four new vice presidents to head major operating divisions and the appointment of several other new executives to important positions. The vice presidents are Herman L. Moekle who has been secretary of the company, in charge of finance; J. R. Davis, in charge of sales and advertising; John S. Bugas, in charge of industrial relations, and Albert J. Browning, in charge of purchasing, the latter just appointed to this post following his release May 1, from the Department of Commerce.

M. L. Bricker continues as vice president in charge of manufacturing and a

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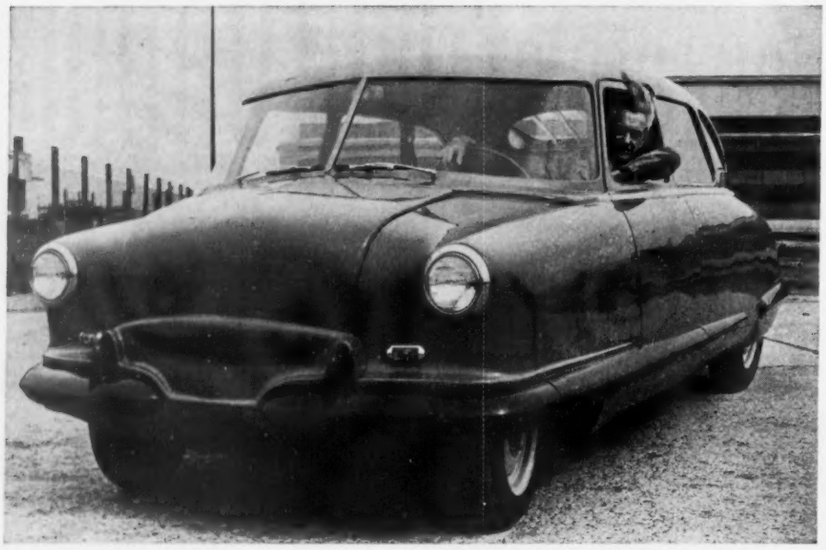


Designer W. B. Stout poses at the wheel of his latest automotive creation, featuring fiberglass-and-plastic body panels, structural members and flooring. The project is strictly experimental, and there are no plans for production of the vehicle which would be far too costly to build with present materials and methods

member of the board. L. E. Briggs has been named treasurer to fill the vacancy created by the appointment of B. J. Craig as manager of the company's nonprofit enterprises, including the Ford Foundation, Edison Institute and Museum and the Wayside Inn, Sudbury, Mass. Mr. Craig also is a director and will take over many of the activities of the late Frank Campsall who served for many years as secretary to the elder Mr. Ford.

H. E. Schluchter has been appointed secretary to fill the vacancy created by the elevation of Mr. Moekle. Fred A. Thomson becomes assistant secretary and assistant treasurer. Gordon Cornwell is the new auditor, succeeding Mr. Briggs. W. S. James, director of research, has been named to the staff of Henry Ford II, responsible to the president for all research. Present board of directors numbers seven—the two Henry Fords, Benson Ford and Messrs. Craig, Bricker, Davis and Moekle.

This pretty well concludes the epochal changes effected in the executive ranks of Ford in the past couple of years, and the new generation seems firmly established in the saddle. With it has come a new day at Ford and many sharp deviations from policies prevailing over the past three decades. Company officials are appearing regularly at public functions now where they formerly maintained a studious absence, perhaps often under instructions from the top. The old day of the iron fist and one-man rule is now history. Its weakness has been demonstrated to those in charge of the reorganization in the seeming shortage of top-caliber talent to move up into positions of the high command. Doubtless this situation will be corrected, for if there is anything a mass production industry demands to survive and profit it is a full complement of executive talent, two or three deep at every post.

The facts of Ford's dealings with the UAW-CIO and the philosophy of industrial relations now prevailing at the Rouge are being told publicly. Mr. Bugas and his assistant, M. B. Lindquist, have both in the past ten days delivered speeches on the subject, the former at the Chicago Association of Commerce Apr. 29, and the latter before the Pittsburgh SAE section on Apr. 25. Acknowledging much remains to be accomplished in developing mature industrial relations policies, Mr. Bugas delineated five steps which he considered as of immediate concern: More emphasis on better labor relations techniques and human engineering—probably the No. 1 aim of the younger Henry Ford; and approach to industrial problems that will make further government intervention unnecessary; more responsibility on both sides of the bargaining table, a responsibility that carries through when the bargaining itself is done; a better understanding of the real nature and significance of human relations in industry; and more clarity on the intimate relationship between productivity and wages.

"I don't know whether these goals can be attained," Mr. Bugas told his listeners. "I do know that we can work toward them. And I will venture the opinion that, if we could achieve these goals, we would also have a greater measure of industrial efficiency and stability. If we want this, we must work for it, by promoting some of these things we have been talking about, so that they become characteristic of the labor relations of the future, not just expressions of wishful thinking."

Mr. Bugas' doubt of any early success can be understood easily in the light of the current attitude of the Ford local of the UAW-CIO. Its leaders are already mumbling about more strike action if the 18-cent wage increase granted in recent negotiations is not incorporated in paychecks at once. Stipulations were that the increase would be effective 30 days preceding ratification of the contract by the union. But ratifying action has been stalled by the union for weeks, with the hot-head element screaming loud protests over the mild and almost meaningless provisions for "company security" in the contract.

Reviewing the 113-day strike of the UAW-CIO against General Motors in a special message to stockholders, Alfred P. Sloan Jr., chairman of GM, summarized the three basic issues in the strike, namely: An inflationary wage demand; the question of whether "ability to pay," coupled with a demand to "inspect the books" is pertinent to wage negotiations; and an attempt by the union to encroach on management's responsibility to manage.

"Each issue involved a challenge," Mr. Sloan said, "and each challenge has been met as it must always be met so long as the economy is to function, as it has in the past, on a free competitive basis and in the long-term interests of all . . . Whatever the intent may have been, whether consciously or not, whether deliberately or not, whether for purposes of propaganda or not, the demands made upon GM by the UAW-CIO, if granted, would have constituted an impractical pattern for management-labor relationships and a deeply significant step toward the socialization of American industry."

Scrapping of automobiles over the 20-year period, 1925-1944, has averaged 2,161,851 cars and trucks per year, according to R. L. Polk & Co., industry statisticians. This may be considered to be the normal annual replacement market but of course has no bearing whatever on current demand for new cars and trucks.

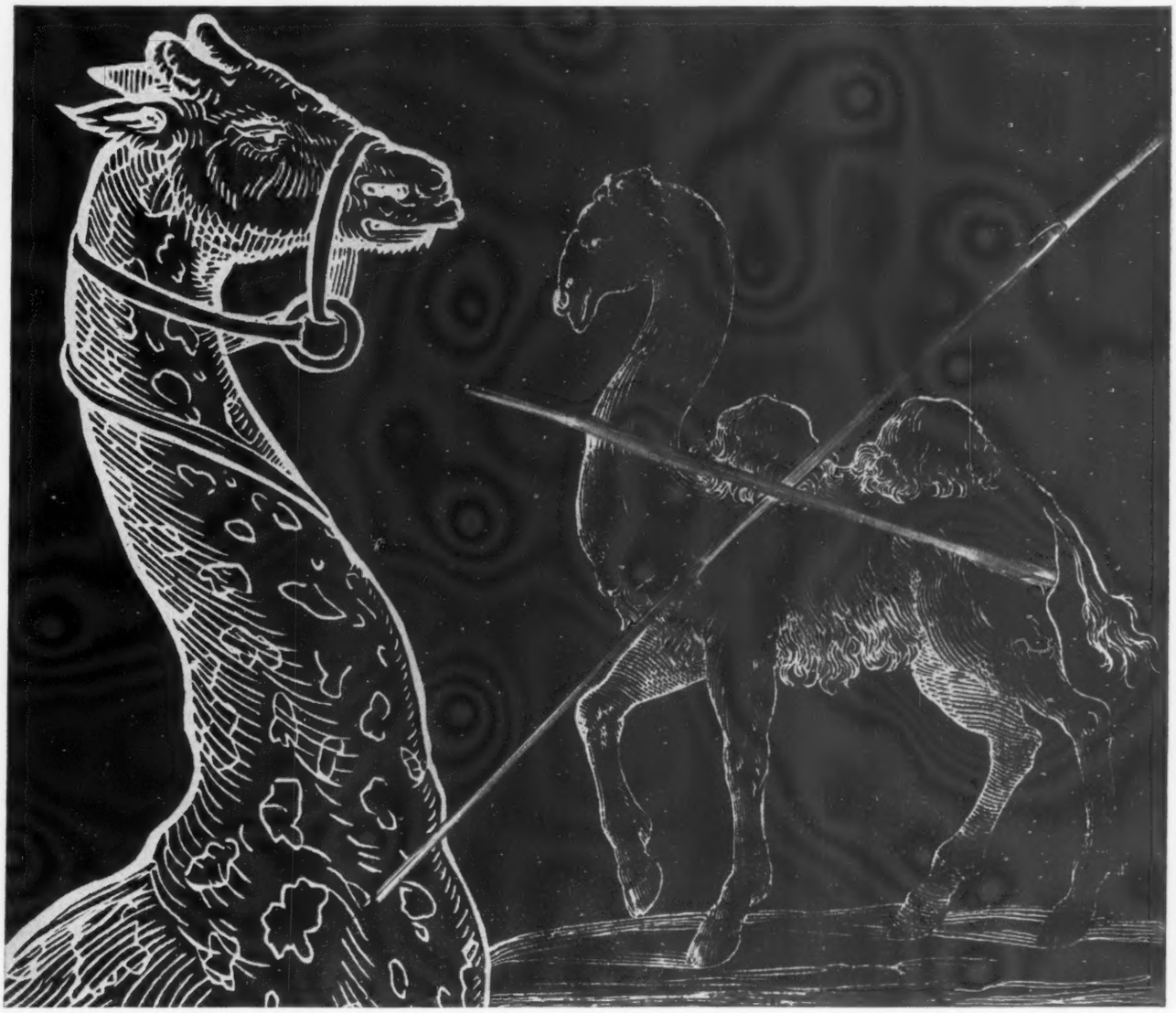
The compilation was made in this way: There were 17,476,254 units in use as of Dec. 31, 1924. To this is added 54,342,259 cars and trucks sold in the 20 years through Dec. 31, 1944, making a grand total, if there had been none scrapped, of 71,818,513. Registrations as of the end of 1944 totaled 28,581,487, making a difference of 43,237,026 for the 20 years, or an annual average as given above. In the totals passenger cars and trucks were in the ratio of about 7 to 1.

ONE MORE STRAW—ONE LESS CAMEL!

Many centuries ago the weight of one last straw broke a camel's back. Thus somebody's artless optimism about the strength of a vital part wrecked a perfectly good materials handling system.

Today it is plain, cold fact that ignoring the depressing effect of low temperatures on the impact strength of vital steel parts can be a short cut to a long line of avoidable, costly troubles.

The solution for the problem in the fable was less load or more camel. For the modern problem the answer is a molybdenum steel that combines the deep hardening and freedom from temper brittleness necessary to provide good low temperature impact strength.



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CLIMAX FURNISHES AUTHORITATIVE ENGINEERING DATA ON MOLYBDENUM APPLICATIONS.

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MOLY

MEN of industry

JAMES T. LOCKWOOD

FRANCIS M. RICH

HAROLD J. BAIR

James T. Lockwood has joined Lonn Mfg. Co. Inc., Indianapolis, as vice president in charge of sales. Formerly he was in charge of industrial selling in Indiana for Fansteel Metallurgical Corp., North Chicago, Ill., and its subsidiary, Vascoloy-Ramet Corp.

—o—

Francis M. Rich, formerly with the Steel Co. of Canada Ltd., Hamilton, Ont., has been appointed vice president in charge of operations at the iron and steel plant in Fontana, Calif., of Kaiser Co. Inc. He succeeds the late **Peer D. Nielsen.** Mr. Rich has had more than 20 years' experience in the iron and steel industry. In 1938 he became assistant to the vice president and works manager, Steel Co. of Canada, and in 1943 he was promoted to assistant works manager of the Hamilton works of that company, which position he has held until his present appointment with Kaiser.

—o—

Harold J. Bair, president, Empire State Culvert Corp., Groton, N. Y., recently was elected president of the Toncan Culvert Manufacturers Association, at its annual meeting held in Cleveland. **O. H. Miller,** president, Choctaw Inc., Memphis, Tenn., was elected the association's vice president; **N. J. Thompson,** sales manager, Thompson Pipe & Steel Co., Denver, Colo., secretary and treasurer.

—o—

Elmer B. Jones has been appointed general traffic manager, Norton Co., Worcester, Mass. **J. Douglas Dawson** has been named traffic manager, Abrasive Division and **Hugh A. Allen,** traffic manager, Machine Division. Mr. Jones joined the Norton staff as assistant traffic manager in 1929.

—o—

R. L. Davies, formerly Cleveland zone manager, Nash Motors Division, Nash-Kelvinator Corp., Detroit, has been named zone manager in Dallas, Tex., succeeding **R. R. Compton** who continues as southern regional manager. Succeeding Mr. Davies in Cleveland is **E. D. Howerton,** previously assistant manager of the Dallas zone. **H. S. Baker** now holds that position.

—o—

Owen H. Wenning has been appointed sales manager, Worcester Pressed Steel Co., Worcester, Mass. Mr. Wenning has been the company's district representative in New England, and since 1942 has served as assistant sales manager. He also has been elected a director of the company. **Carter C. Higgins,** vice president in charge of sales, will assume other duties in a new position in which he will be in charge of public, industrial and labor relations. **Charles J. Sauter** has been appointed advertising manager and assistant sales manager.

—o—

Boyd Watson, district manager of the New York office, Spang-Chalfant Division, National Supply Co., Pittsburgh, retired May 1 after 41 years with the division and its predecessor, Spang Chalfant Inc. **W. J. Stanton,** who has been with the company 14 years, succeeds Mr. Watson. From 1941 throughout the war, Mr. Stanton was the company's liaison representative in Washington.

—o—

William K. Frank and **Col. Willard F. Rockwell** have been elected directors, United Engineering & Foundry Co., Pittsburgh. Mr. Frank is a former director of the company who returned recently from a long period of government service. Colonel Rockwell is chairman and president, Rockwell Mfg. Co.

—o—

The following have been elected vice presidents of the L. B. Foster Co. Inc., Pittsburgh: **L. S. Barry,** in charge of the New York branch; **Henry E. Fleishman,** office manager of the Chicago branch; **Glenn Morrow,** head of pipe operations; **E. J. Shellaby,** sales manager, Pittsburgh office.

—o—

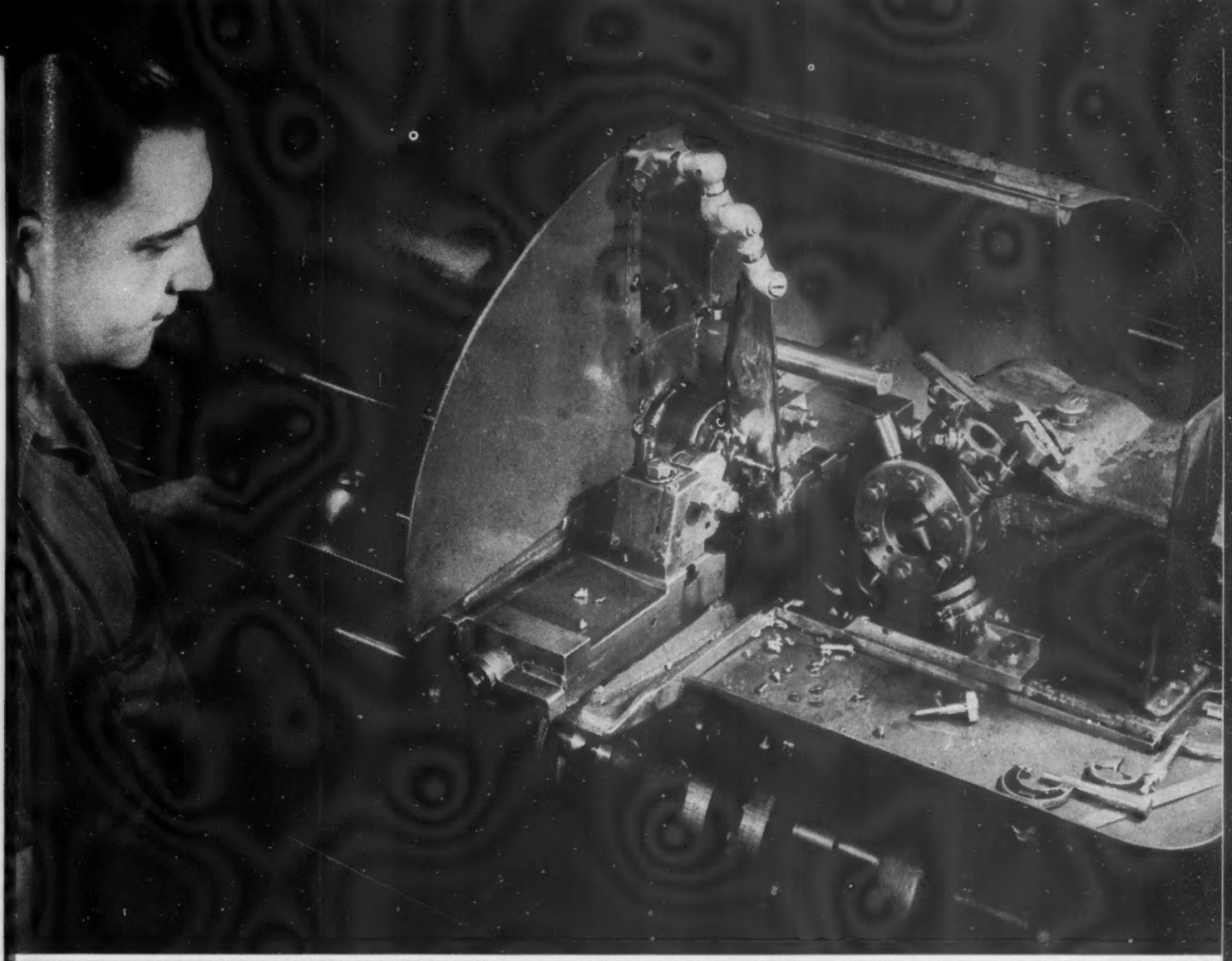
James G. Shennan has been appointed vice president in charge of manufacturing, Elgin National Watch Co., Elgin, Ill., to succeed **P. E. Stringer,** retired. Mr. Shennan joined the company in 1932 and since 1938 has been general factory superintendent and assistant to Mr. Stringer. **Milton J. Hill,** formerly director of labor relations, has been named personnel director.

—o—

J. L. Holloway, formerly vice president in charge of the Finance & Control Division, Crane Co., Chicago, has been elected president to succeed **John H. Collier,** who has been advanced to chairman, the post held by the late **J. B. Berryman.** The responsibilities of **P. R. Mork,** executive vice president, have been expanded. **C. R. Crane II,** vice president, becomes a director to succeed Mr. Berryman.

—o—

Herman W. Steinkraus has been elected chairman of the board of directors, Bridgeport Brass Co., Bridgeport, Conn., to succeed the late **William R. Webster.** Mr. Steinkraus, in addition to being elected chairman, was re-elected



STAINLESS STEEL . . . TOOL LIFE *Up 400%*

SUNICUT . . .

Increases Production from 75 to 380 Pieces per Grind

A manufacturer of automotive parts formerly obtained from 20 to 75 pieces between tool grinds, and was troubled with high drill-breakage.

Changing to Sunicut, for a cutting lubricant, he was able to increase tool life more than four hundred per cent — to 380 pieces per grind. Finish was improved. Here are the facts:

Machine . . . Brown & Sharpe 2-G Automatic

Operations . . . Drilling, reaming, forming, and cutting off

Material . . . Stainless steel

Cutting Lubricant . . . Sunicut

For heavy cuts at high speeds, for high accuracy, and satin smooth finish, Sunicut is widely used for many different types of cutting operation.

Sunicut is a clear, free-flowing, sulphurized oil produced by an exclusive Sun process. It has high lubricating qualities, is an excellent dispenser of heat. Call the Sun Cutting Oil Engineer near you for full details.

SUN OIL COMPANY • ***Philadelphia 3, Pa.***

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INDUSTRIAL PRODUCTS

CARL J. LAMB

FRANK W. FAERY

president. **William R. Breetz,** treasurer, was elected a director, the other members of the board being re-elected.

—o—

Capt. Carl J. Lamb, USNR, recently released from active duty, has joined Hydropress Inc., New York, as vice president. Previous to his tour of active duty, Mr. Lamb had considerable experience as consulting engineer, was New York district manager, Sharples Corp., Philadelphia, and for eight years was a turbine engineer with Westinghouse Electric Corp., Pittsburgh.

—o—

Jerome Friedman, formerly connected with the Bancroft branch, Reliance Steel Division, Detroit Steel Corp., Detroit, now heads United Steel Products Inc., 118 Grove St., Worcester, Mass., which will be engaged in the distribution and processing of flat-rolled steel products.

—o—

Victor Matulaitis has been appointed sales engineer for the Heater Division, Eaton Mfg. Co., Cleveland. Mr. Matulaitis will direct the division's experimental and development activities in connection with automobile and truck heater-defroster units and will also act as engineering consultant to automobile and truck manufacturers. He will divide his time between the company's home offices in Cleveland and the Wilcox-Rich Division's offices in Detroit.

—o—

D. O. Bayless, Houston, Tex., has been named special factory service engineer for the southwestern United States by Edward Valves Inc. Prior to his four and a half years' service with the Army, Mr. Bayless was associated with the Texas Co. as an engnieer assigned to production and drilling projects.

—o—

G. M. Glidden, formerly district manager, E. D. Bullard Co., is the head of a partnership which has recently purchased the interests of the Acme gas mask from the Acme Protection Equipment Co., Pittsburgh. Mr. Glidden will supervise production and sales as general manager, and will transfer operations to 3035 W. Lake St., Chicago.

—o—

Frank W. Faery has been appointed district manager, Alloy Casting Co., Champaign, Ill., and will have offices in the Maccabees Bldg., Detroit. Mr. Faery for 19 years was sales engineer, Park Chemical Co., Detroit, and during the four war years, operated his own heat treating plant. His territory with the Alloy Casting Co. includes Michigan and Toledo, O.

—o—

Golden Latshaw has been appointed by Calgon Inc., Pittsburgh, as its first representative in the sale of its new Banox rustproofing treatment of steel and galvanized steel.

—o—

R. W. Biggs has been named works manager of the Ambridge, Pa., plant, National Electric Products Corp., Pittsburgh, succeeding **Neil C. Lamont** who has reached retirement age. Mr. Biggs' experience has included positions with National Tube Co., and Jones & Laughlin Steel Corp., and for the past five months he has held an administrative post in the general offices of the National Electric company.

—o—

S. Saul Jr., chief engineer, Rack Engineering Co., Pittsburgh, has left on a tour of European cities, to include London, Paris, Antwerp and Stockholm, where he will supervise installation of offices and facilities for manufacture of the company's products.

—o—

D. F. Roloff, assistant manager of sales, specialty transformer section, has been appointed assistant manager of the newly-created Specialty Transformer Division, General Electric Co., Schenectady, N. Y. **H. K. Pritchard,** with the company since 1927, has been named manager of sales, general purpose components section of the new division and C. Stonehill, with the company since 1929, has been appointed manager of sales, lighting components section.

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Fred M. Fries has been appointed research and development engineer, and **Walter L. Zeedyk,** service manager, Conlon Corp., Chicago.

—o—

R. S. Stover has been named supervisor, Philadelphia-Washington district, Ampco Metal Inc., Milwaukee. Mr. Stover previously was district manager of the Washington office. **Elmer E. Whitson** remains as Philadelphia district manager.

—o—

Ralph Wann, Canon City, Colo., has been elected a director of the Colorado Fuel & Iron Corp., Denver, Colo.

—o—

John L. Furey Jr., Cheltenham, Pa., has been appointed sales and service representative, Swan-Finch Oil Corp., New York, in the Philadelphia territory.

—o—

Ervin Jackson, president, Birmingham Chamber of Commerce, has been elected a member of the board of directors, Alabama Power Co.

—o—

Milton H. Smith has been named supervisor of fork-type lift truck engineering, Hyster Co., Portland, Oreg. With the company four years, Mr. Smith formerly was chief engineer, Hydraulic Equipment Co., Cleveland.

—o—

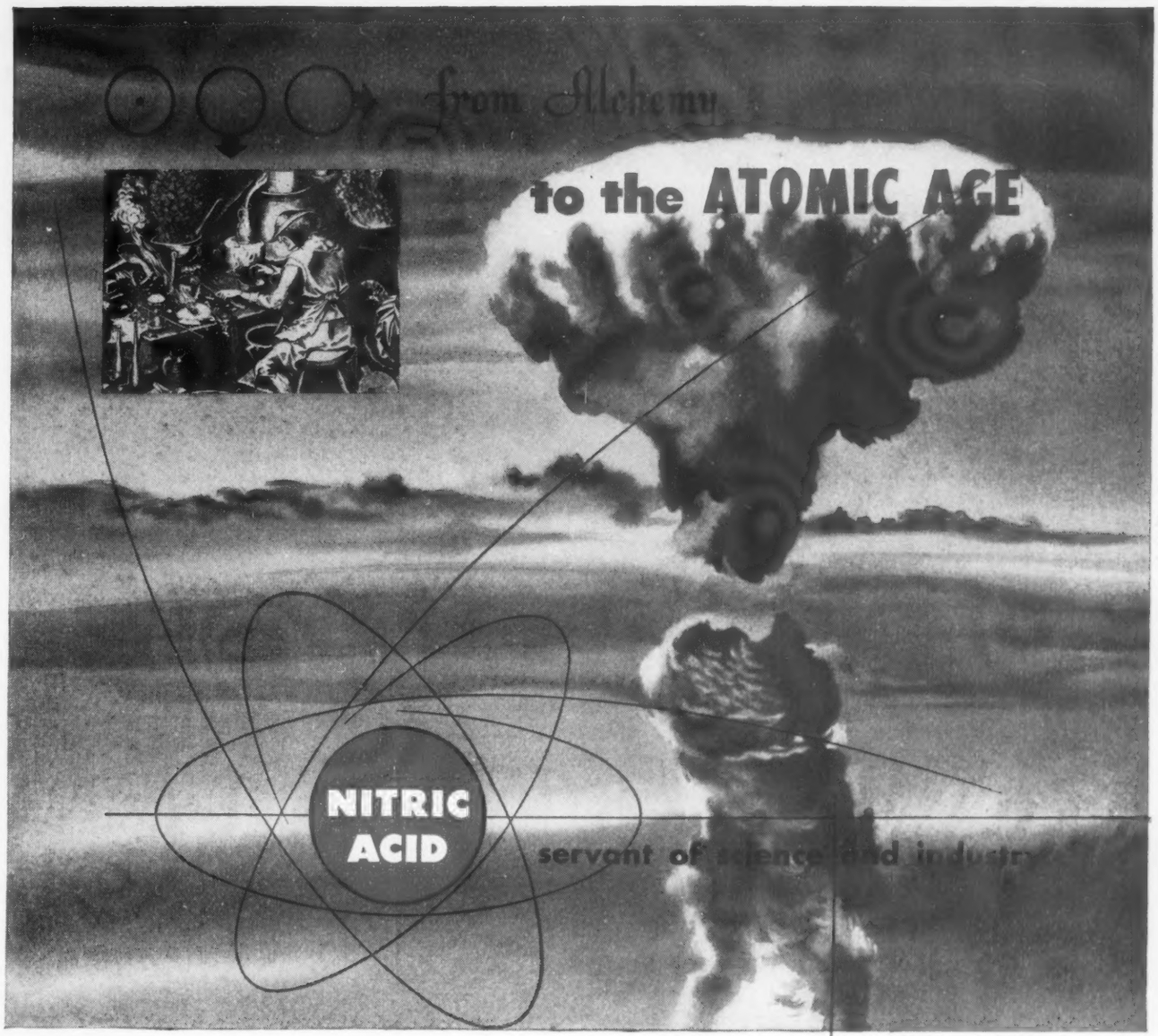
Harold B. Maynard, president, Methods Engineering Council, Pittsburgh, has been elected president, Society for the Advancement of Management. William L. McGrath, president, Williamson Heater Co., Cincinnati, was elected executive vice president.

—o—

B. F. Goodrich Co., Akron, announces the following appointments: **Harry N. Roberts,** recently returned from the Navy, manager of battery and spark plug sales; **Walter J. Haecker,** formerly general supervisor, Pittsburgh district, manager, Jacksonville, Fla., district, Tire Replacement Sales Division; **W. D. Jones,** manager, Industrial Tire & Track Division; and M. G. Huntington, assistant general manager, Associated Tire Line Sales Division.

—o—

Paul G. Marsh has been appointed assistant production manager, Organic Chemicals Division, Monsanto Chemical Co., St. Louis. **A. J. Pastene** has been promoted to succeed Mr. Marsh as manager of the company's John F. Queeny plant in St. Louis. At the same



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C.P. Reagent A.C.S. Sp. Gr. 1.42
Fuming, Sp. Gr. 1.49-1.50, Reagent
Red, Fuming, Sp. Gr. 1.59-1.60, Reagent

MIXED ACID
Varying proportions of Nitric and Sulfuric Acids up to 100% total acidity to meet customers' requirements.

plant **E. T. Stehlby** has been promoted to the newly created position of assistant plant manager and **Roy G. Hemminghaus, Walter Meyer** and **J. W. McCrackin** now are manufacturing superintendents.

—o—

Raymond L. Seitz has been named to the West Coast sales engineering staff, Foote Bros. Gear & Machine Corp., Chicago. He will make his headquarters in the company's office in Pasadena, Calif. For many years, Mr. Seitz has been connected with the Lockheed Aircraft Corp., Burbank, Calif., as power plant engineer.

—o—

Westinghouse Electric Corp., Pittsburgh, has announced the following appointments: **Sidney C. Palmer,** manager, Marine & Transportation Divisions; **Frederick S. Bacon Jr.,** manager, Central Station Division, New England district; **W. H. McKnew,** service manager, Home Radio Division. A decoration of the government of France which was awarded **Dr. Joseph Slepian,** associate director of the company's research laboratories, in 1939, recently was conferred upon him, naming him officially an "Officier d'Academie." The 7-year delay in completing the formalities was caused by the outbreak of the war and subsequent events.

—o—

George A. Kelly, vice president in charge of public relations and advertising since 1934, Pullman Co., Chicago, has been elected executive vice president of the company. Mr. Kelly succeeds **Champ Carry** who resigned to become president, Pullman-Standard Car Mfg. Co., a subsidiary.

—o—

Clarence W. Custer, president, American Stamping Co., Cleveland, was elected president, Pressed Metal Institute, Cleveland, at the annual meeting of the institute's board of trustees held recently.

—o—

Frederick W. McIntyre Jr. has been elected vice president and **Donald H. Dalbeck,** treasurer, Reed-Prentice Corp., Worcester, Mass. They succeed **Charles S. Payson,** who had held both positions, and who continues as a director of the company.

—o—

Benjamin O'Shea has retired as chairman of the board of directors, Union Carbide & Carbon Corp., New York. Mr. O'Shea had been associated with the company and its predecessors since 1898 and he will remain as a director and member of the executive committee. Since Mr. O'Shea's retirement the position of chairman was abolished. **Fred H. Haggerson** was re-elected president.

—o—

Raymond K. Watkins has been appointed hardware representative in West Virginia, southern Pennsylvania and the border communities in Maryland, Virginia and Kentucky, with headquarters in Pittsburgh, for the Stamford Division, Yale & Towne Mfg. Co., Stamford, Conn.

—o—

Jay J. Seaver, vice president, Day & Zimmermann Inc., Philadelphia, opened an engineering office May 1 under the name of Jay J. Seaver Engineers, 100 N. LaSalle St., Chicago.

—o—

J. L. McBride has been appointed district purchasing agent for southern California, Bethlehem Pacific Coast Steel Corp., and will be located at the plant of the company in Vernon, Calif. **James L. Fee** has been appointed manager of industrial relations.

—o—

Herbert M. Rich Jr., who has been district manager of Electro Metallurgical Sales Corp. in New York for the past three years, has been appointed division manager of the New York and Birmingham territories. He will continue to make his headquarters in New York.

—o—

James B. Armstrong has been appointed district sales representative in the metropolitan New York area, Dodge Steel Co., Philadelphia. Mr. Armstrong has represented Hartford Electric Steel Corp., Hartford, Conn., for the past 15 years. **Ward W. Weller** has been appointed the company's district sales representative in New England. Affiliated with the steel castings industry for more than 20 years, Mr. Weller maintains offices as Ward Weller Co., 92 Broadway, Cambridge, Mass.

—o—

Thomas C. Stirling remains as district manager in Detroit for the New Britain-Gridley Machine Division, New Britain Machine Co., New Britain, Conn., and he will be assisted by **Charles W. Coffin** and **William H. Nettle,** recently appointed sales engineers for the Michigan territory.

—o—

Carl O. Wold, a vice president of Caterpillar Tractor Co., Peoria, Ill., who was executive head of the Russell Grader Mfg. Co. prior to its acquisition by the Caterpillar company in 1928, has retired.

—o—

Marvin A. Heidt recently was elected vice president in charge of industrial relations, Bendix Aviation Corp., Detroit. Mr. Heidt joined the organization in May, 1939, and has served as director of industrial relations since that time.

—o—

James M. Hamilton, secretary, Dumore Co., Racine, Wis., has been named vice president in charge of engineering and manufacturing. **James Tate,** former director of marketing, has been named vice president in charge of sales. Both are new positions created at a recent meeting of the company's board of directors. **George E. Shoup,** controller, was elected secretary. Other officers of the company were re-elected.

—o—

Marshall M. Smith, who recently returned from Great Britain and France, where for the past nine months he managed the operations of the British and French companies of E. W. Bliss Co., Detroit, has been named assistant general sales manager. He will continue to supervise all the company's export sales as well as the foreign operations at the company's Derby, England, and Paris, France, plants.

—o—

Ernest C. Huehner, manager, central office supply bureau, Carnegie-Illinois Steel Corp., Pittsburgh, has been award-

CLARENCE W. CUSTER

HERBERT M. RICH JR.

HARRY L. WISE

Who has been elected president and general manager, Superdraulic Corp., Dearborn, Mich., noted in STEEL, Apr. 29 issue, p. 82.

LUCILLE BELL

Who has been appointed advertising manager, Washington Steel Corp., Washington, Pa., noted in STEEL, Apr. 29 issue, p. 87.

FRANK A. YUSEK

Recently named factory superintendent, Ivanhoe Division, Reliance Electric & Engineering Co., Cleveland, in STEEL, Mar. 4 issue, p. 114.

ed the Gary 50-year service medal. Mr. Huehner joined the Illinois Steel Co. in 1896 as an office boy. He served as an executive in the office supply bureau in Chicago from 1914 to 1938 when he was transferred to his present position in Pittsburgh.

—o—

R. W. Clansky, formerly vice president and treasurer, has been elected president, Standard Forgings Corp., Chicago. Other officers elected are: **James A. Cook,** formerly vice president in charge of sales, executive vice president; **A. M. Olson,** formerly assistant secretary, treasurer and assistant secretary; **G. D. Bassett,** formerly director of purchases, vice president in charge of purchasing.

—o—

James B. Robarts, formerly head of transportation and shipping, Superior Sheet Steel Co., Canton, O., has been appointed general superintendent in charge of operations. He succeeds the late **J. Hugh Hill.**

—o—

Graydon Megan, Chicago, has been elected secretary, Inland Steel Co., Chicago, succeeding **J. H. Morris,** who is retiring after 28 years with the company. Mr. Megan joined the company in 1938 and recently returned from three and one-half years' service with the Army.

—o—

E. C. Wilson, formerly district manager at Detroit, Warner & Swasey Co., Cleveland, has been named to head sales of the company's new multi-spindle automatic bar machine. Succeeding Mr. Wilson as manager at Detroit is **I. T. White,** formerly district manager at the company's Buffalo office. **Alexander Sellers Jr.,** formerly field engineer at Detroit, has been promoted to the Buffalo position. **L. M. Cole** has been named southern district manager. He formerly was in charge at Houston, Tex., and he is replaced there by **H. M. Worstell,** who has been field engineer at Newark, N. J.

—o—

F. T. Isaacson has been elected secretary and general sales manager, Young Iron Works, Seattle. Mr. Isaacson formerly was associated with Isaacson Iron Works as a director, vice president and manager of the Tractor Equipment Division. Other officials of the Young Iron Works include: **A. E. Hansen,** vice president, **Herb Nelson,** logging sales engineering, and **William Lindersmith,** purchasing agent.

OBITUARIES...

John J. O'Brien, founder and retired chairman of the board, South Bend Lathe Works, South Bend, Ind., died Apr. 24.

—o—

William C. Dickerman, 71, who retired in December, 1945, as chairman of the board, American Locomotive Co., died at his home in New York, Apr. 25. Mr. Dickerman was active for 50 years in the railroad equipment field. He joined the American Locomotive Co. in 1929 as president, and was named chairman in 1940. Upon resigning that position, he continued as a member of the executive committee and board of directors.

—o—

Henry O. Forrest Sr., assistant vice president, M. W. Kellogg Co., an engineering and contracting company in New York, died recently at his home in Teaneck, N. J. Prior to joining the Kellogg company in 1931, Mr. Forrest had been an instructor and professor of research at Massachusetts Institute of Technology, from which college he was graduated in 1920.

—o—

William M. White, 73, a civil engineer with American Bridge Co., Pittsburgh, for 43 years, and contract manager of its New York office for 20 years prior to his retirement in 1938, died Apr. 25 at his home in Fanwood, N. J.

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C. J. Rice, 60, president and general manager for the past 25 years, Sterling Inc., Milwaukee, died Apr. 21 in Hollywood, Calif.

—o—

LeRoy G. Whitmer, 74, vice president and treasurer, American Foundry & Furnace Co., Bloomington, Ill., died Apr. 22 in that city. He retired from the presidency of the company several years ago to assume his recent post.

—o—

J. Hugh Hill, 46, general superintendent in charge of operations for the past six years, Superior Sheet Steel Co., Canton, O., died in that city recently. Mr. Hill had been associated with the company since its organization.

—o—

Burton L. Gale, 87, machinery inventor, died recently in Wilson, N. Y.

—o—

William T. Hodge, contracting engineer, Phoenix Bridge Co., Phoenixville, Pa., died Apr. 20 in that city. Mr. Hodge had been affiliated with the company for more than 40 years, at one time serving as contracting engineer for the Philadelphia district. He was in his late sixties.

Net Earnings of Steel Industry In 1945 Continued Downtrend

THE ENDING of war production is reflected in STEEL's financial analysis of the steelmaking industry for 1945. Curtailed demand for steel for war lowered ingot production, net sales, and net income, thereby reducing federal income taxes.

For the fourth consecutive year net income before dividends declined from that of the preceding year.

From a business standpoint, 1945 was a year in which mixed conditions resulting from the ending of war and the transition to peacetime production affected income statements of the various industry units in differing degrees. These conditions and their influence, as well as the effect of carry-back provisions on federal taxes, renegotiation, reductions in reserve for contingencies, and accelerated depreciation, on financial statistics figure prominently in the compilation for the year. The year 1945 was the first one in which all of these factors came into play.

Net income (additions to earned surplus) of 26 steel ingot producers representing 87.88 per cent of the nation's steelmaking capacity aggregated $172,245,551 in 1945, compared with $174,228,680 in 1944. Two of the 26 companies reported a loss for 1945, while one showed a loss for 1944.

Total income on capitalization amounted to 5.24 per cent in 1945, an increase over the 5.02 per cent of 1944. Total income before dividends and interest on bonds increased from $200,427,527 in 1944 to $205,398,928 in 1945, while total capitalization declined from $3,987,150,426 in 1944 to $3,917,697,948 in 1945.

Average earnings per common share of stock declined from $3.70 in 1944 to $3.60 in 1945. Also showing a decline were total preferred dividend requirements, which in 1945 were $44,088,860, compared with $45,321,5[illegible] in 1944.

Four companies omitted paying dividends on common stock in both 1945 and 1944. Three producers increased dividends in 1945, four paid less, while 15 made no change in dividend rates.

Total ingot output of 22 of the companies was 68,575,397 tons in 1945, compared with 77,347,691 tons in the previous year. Rated ingot capacity as of Dec. 31 for 25 reporting companies aggregated less in 1945 than in 1944, although most of the reduction was accounted for by one company. Average operating rate of 21 of the ingot producers was 91 per cent in 1945, compared with 98.5 per cent for the previous year.

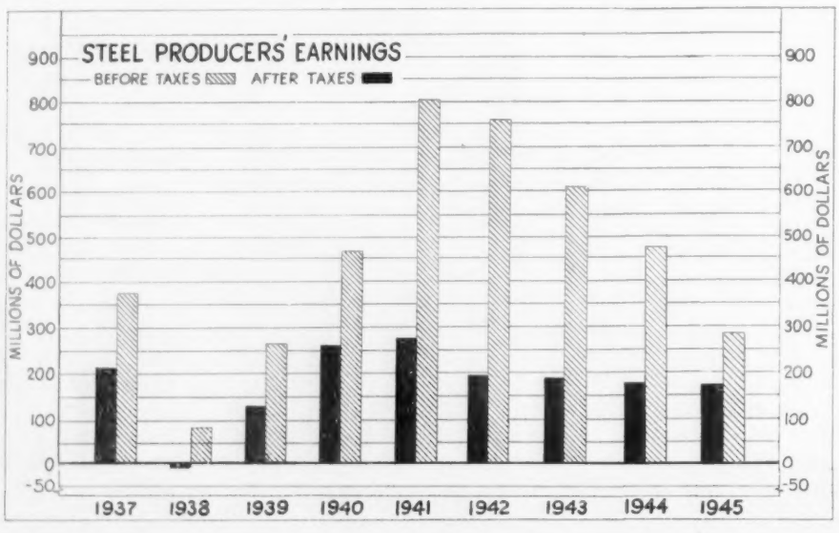
Aggregate net sales in 1945 for 25 reporting companies were $5,564,284,218, a decline from the $6,393,401,433 of 1944. Average net profit margin (net income divided by net sales) was 3.06 per cent in 1945, compared with 2.68 per cent in 1944.

The tapering off and ending of war production in 1945 was reflected significantly in a drop in the aggregate amount of federal income taxes the companies had to provide for in 1945 compared with 1944. Aggregate federal income taxes of 25 of the companies in 1945 were $110,792,838.

Also down in 1945 were employment and payrolls. Part of the decline in total payrolls was due to reduced hours of work, with a resultant decrease in premium payments for overtime. Twenty-four of the companies had an aggregate average of 714,148 employees in 1945, compared with 807,880 in the previous year. Aggregate payrolls of 25 of the companies in 1945 were $2,264,423,634, against $2,647,393,665 in 1944.

A significant reduction in total funded debt was made in 1945 from the preceding year. Aggregate funded debt in 1944 was $578,652,684, whereas in 1945 it was down to $478,679,600. All but three of the companies having funded debt in 1945 had reduced it from 1944. Eleven companies reported no funded debt in 1945, compared with only eight companies in 1944.

While there was a slight decrease in aggregate current assets of the 26 companies, there was a considerable reduction in current liabilities, with a resultant rise in ratio of current assets to current liabilities from 2.71 to 1 in 1944 to 3.68 to 1 in 1945.



STEEL acknowledges with appreciation the co-operation of the companies which provided data for the summary that appears on the adjacent page. Additional copies of the summary may be obtained from Readers' Service Department, STEEL.

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In

	Number of Shares of Common Stock Outstanding		Common Stock Valuation		Preferred Stock Valuation		Fur
	1945	1944	1945	1944	1945	1944	1945
United States Steel Corp.	8,703,252	8,703,252	$652,743,900	$652,743,900	$360,281,100	$360,281,100	$ 78,638,831
Bethlehem Steel Corp.	2,984,994	2,984,994	283,574,430	283,574,430	93,388,700	93,388,700	120,881,970
Republic Steel Corp.	5,669,922	5,669,922	130,309,141	130,309,141	28,214,300	32,873,600	65,750,000
Jones & Laughlin Steel Corp.‡°.	1,998,212	1,602,488	80,564,400	67,373,600	45,358,200	58,682,200	28,198,529
Youngstown Sheet & Tube Co.	1,675,008	1,675,008	105,088,053	105,088,053	None	15,000,000	36,060,270
National Steel Corp.	2,206,492	2,206,392	55,162,300	55,159,800	None	None	40,000,000
Inland Steel Co.	1,633,105	1,633,105	62,500,000	62,500,000	None	None	30,907,000
American Rolling Mill Co.	3,241,315	2,869,560	32,413,153	71,739,009	44,993,000	44,993,000	14,000,000
Wheeling Steel Corp.	569,559	569,559	28,477,950	28,477,950	36,316,600	36,316,600	27,750,000
Crucible Steel Co. of America	444,698	444,698	11,117,443	11,117,443	31,628,300	31,872,000	12,217,000
Colorado Fuel & Iron Corp.#°	563,620	563,620	5,636,200	5,636 200	None	None	10,250,000°
Pittsburgh Steel Co.	508,917	508,917	4,862,190	4,862,190	16,392,580	16,335,740	7,476,000
Lukens Steel Co.	317,976	317,976	3,179,760	3,179,760	None	None	800,000
Granite City Steel Co.	382,488	382,488	8,483,821	8,483,821	None	None	None
Sharon Steel Corp.	392,331	392,331	3,974,530	3,974,530	5,972,000	5,972,000	5,000,000
Alan Wood Steel Co.	200,000	200,000	4,388,889	4,388,889	7,182,433	7,182,433	None
Midvale Co.	600,000	600,000	10,574,621	10,574,621	None	None	None
Allegheny Ludlum Steel Corp.	1,263,186	1,263,025	7,894,913	7,893,906	None	None	None
Continental Steel Corp.	200,561	200,561	5,276,243	5,276,243	None	None	None
Laclede Steel Co.	206,250	206,250	4,125,000	4,125,000	None	None	750,000
Central Iron & Steel Co.	224,540	224,540	2,245,400	2,245,400	None	None	None
Keystone Steel & Wire Co.	757,632	757,632	3,156,800	3,156 800	None	None	None
Follansbee Steel Corp.†°	217,706	217,706	2,177,061	2,177,061	2,547,913	2,547,913	None
A. M. Byers Co. °#	264,635	264,635	2,646,350	2,646,350	5,566,500	5,624,000	None
Harrisburg Steel Corp.	183,300	183,300	1,150,000	1,150,000	None	None	None
Northwestern Steel & Wire Co.§#	163,565	163,565	817,825	817,825	75.000	75.000	None
Total (or average)	35,573,264	34,805,524	$1,512,540,373	$1,538,671,922	$677,916,626	$711,144,286	$478,679,600

	Earnings Per Common Share		Dividends Paid Per Share on Preferred		Dividends Paid Per Share on Common		Average Number Employed		Total Payrolls	
	1945	1944	1945	1944	1945	1944	1945	1944	1945	
United States Steel Corp.	$3.76	$4.08	$7.00	$7.00	$4.00	$4.00	279,274	314,888	$786,721,918	$914
Bethlehem Steel Corp.	9.52	9.93	7.00	7.00	6.00	6.00	203,516	262,133	625,887,729	848
Republic Steel Corp.	1.36	1.44	3.00‡‡	6.00	1.00	1.00	NA	NA	169,212,896	180
Jones & Laughlin Steel Corp.‡°.	2.91	3.14	5.00	5.00	2.00	2.00	37,626	38,412	111,200,254	120
Youngstown Sheet & Tube Co.	4.12	4.25	4.12	5.50	2.00	2.00	21,922	22,291	68,869,225	68
National Steel Corp.	5.04	4.87	None	None	3.00	3.00	22,821	21,191	72,812,293	68
Inland Steel Co.	6.04	6.28	None	None	4.50	4.50	19,336	18,937	59,929,238	57
American Rolling Mill Co.	2.58#	1.84#	4.50	4.50	0.80	0.80	24,207	21,835	70,868,905	64
Wheeling Steel Corp.	3.75	4.51	5.00	5.00	1.50	1.50	18,326	17,474	54,132,892	51
Crucible Steel Co. of America	7.26	5.23	5.00	5.00	2.00	3.00	20,706	24,710	61,600,000	76
Colorado Fuel & Iron Corp.#°	3.47	2.97	None	None	1.00	1.00	9,253	9,836	24,602,007	24
Pittsburgh Steel Co.	3.09°	0.38°	5.50§§	5.50§§	None	None	7,700	7,660	22,563,460	23
Lukens Steel Co.	8.65	1.18	None	None	0.35	1.00	5,175	6,166	15,801,235	18
Granite City Steel Co.	0.18	0.63	None	None	0.17	0.52	2,126	2,018	5,914,229	5
Sharon Steel Corp.	1.86	1.97	5.00	5.00	1.00	1.00	6,069	3,319	13,015,262	10
Alan Wood Steel Co.	0.98°	1.83°	3.25	5.00	None	None	2,719	2,993	8,061,988#§	8
Midvale Co.	3.01	4.18	None	None	2.00	2.00	6,350	7,837	17,981,141	26
Allegheny Ludlum Steel Corp.	2.68	2.70	None	7.00	2.00	2.00	12,078	11,313	34,663,373	37
Continental Steel Corp.	3.05	2.54	None	None	2.00	2.00	2,920	2,804	8,125,878	8
Laclede Steel Co.	1.55	1.55	None	None	1.30	1.30	1,606	1,561	4,331,618	4
Central Iron & Steel Co.	0.16°	0.43	None	None	0.20	0.10	1,382	1,592	3,411,070	4
Keystone Steel & Wire Co.	2.14	2.02	None	None	1.40	1.20	1,728	1,735	6,199,077	6
Follansbee Steel Corp.†°	0.86	0.93°	None	None	None	None	2,068	2,100	5,210,807	5
A. M. Byers Co. °#	2.51	3.96	7.00°	7.00	0.50	0.25	NA	NA	NA	
Harrisburg Steel Corp.	1.61	1.40	None	None	1.10	1.20	4,040	3,850	9,976,506	10
Northwestern Steel & Wire Co.§#	1.29	1.48	7.00	7.00	None	None	1,200	1,225	3,330,633	3
Total (or average)	$3.60	$3.70	....	....	....	....	714,148	807,880	$2,264,423,634	$2,647

NA = Not available.

†After elimination of excess funded debt charges due to refinancing.

††Accrued refund—actual requirement has not been determined because of refunds.

#Based on net income before extraordinary and nonrecurring adjustments.

°Deficit.

§Current provision from income is made and credited to "Reserve for Federal Taxes and Contingencies" pending further clarification of effect of Revenue Act of 1943 and the results of hearings before U. S. government agency for increases in wages and other allowances.

°°Funded debt as of June 30, 1945 represents long-term notes payable banks used to redeem income mortgage bonds included in funded debt at June 30, 1944.

§§Payment on 5½ per cent preferred; no payments either year on Class A or B preferred.

##Refund.

°†Includes 844,200 net tons ingot capacity of Farrell plant.

°§Does not include 844,200 net tons ingot capacity of Farrell plant acquired Dec. 15, 1945.

†°Relating steel ingot output to earnings would be misleading inasmuch as most of company's ingot output is sold in semifinished state and hot-rolled strip is purchased for production of black sheets.

§#Fiscal year ended July 31.

°#Fiscal year ended Sept. 30.

#§Includes estimated provision for retroactive wages as per War Labor Board directive issued Nov. 15, 1944.

#°Fiscal year ended June 30.

†§Rated ingot capacity increased as of Jan. 1, 1945.

§°Estimated refund based on ca

‡Taxes for last six months figur Act of 1945 because the company's

††Dividends paid per share on $6 in 1945 and $6 in 1944.

‡°1944 figures adjusted to reflec war emergency facilities, provision and resulting reduction in federal t

"Net Income Before Dividends" into consideration requirements (n ferred dividends. In computing ear totals, adjusted for preferred divide arriving at earnings per common s the same method is followed.

Boldface type is used under th from all 26 companies were not ava

Financial Analysis of the S

In making interpretations from this analysis, the following should be kept in mind: Carry-back provisions on fed

Official Returns from Twenty-Six Producers, Representin

Junction 1944	Funded Debt 1945	Funded Debt 1944	Surplus 1945	Surplus 1944	Total Capitalization 1945	Total Capitalization 1944	C Per To 1945
360,281,100	$ 78,638,831	$ 92,919,209	$412,958,991	$414,976,620	$1,504,622,822	$1,520,920,829	$52.2
93,388,700	120,881,970	162,724,555	144,756,008	133,342,750	642,601,108	673,030,435	49.8
32,873,600	65,750,000	69,560,877	107,782,019	106,207,420	335,555,460	338,951,038	36.1
58,682,200	28,198,529	30,242,647	76,059,261	73,720,708	230,180,390	230,019,155	45.8
15,000,000	36,060,270	51,870,541	54,983,220	52,189,736	196,131,543	224,148,330	49.0
None	40,000,000	54,826,655	112,555,821	110,050,345	207,718,121	220,036,800	53.2
None	30,907,000	32,500,000	59,600,429	57,088,191	153,007,429	152,088,191	45.0
44,993,000	14,000,000	14,750,000	77,558,346	23,173,547	168,964,499	154,655,556	52.2
36,316,600	27,750,000	31,200,000	27,452,045	26,806,023	119,996,595	122,800,573	61.2
31,872,000	12,217,000	12,217,000	26,961,867	24,610 369	81,924,610	79,816,812	58.8
None	10,250,000**	11,035,200	24,043,426	22,652,067	39,929,626	39,323,467	31.47
16,335,740	7,476,000	7,954,000	18,677,344	19,799,655	47,408,114	48,951,585	44.22
None	800,000	1,152,000	10,553,011	8,474,844	14,532,771	12,806,604	23.29
None	None	1,750,000	4,764,091	4,762,741	13,247,912	14,996,562	32.86
5,972,000	5,000,000	1,600,000	10,337,185	8,602,991	25,283,715	20,149,521	17.08
7,182,433	None	None	4,180,683	4,106,373	15,752,005	15,677,695	28.64
None	None	None	9,090,056	8,482,917	19,664,677	19,057,538	NA
None	None	None	23,890,293	23,033,378	31,785,206	30,927,284	69.04
None	None	800,000	6,525,838	6,314,417	11,802,081	12,390,660	32.42
None	750,000	750,000	2,168,504	2,116,317	7,043,504	6,991,317	21.60
None	None	None	1,496,018	1,504,843	3,775,535	3,750,243	11.24
None	None	None	9,267,443	8,769,405	12,424,243	11,926,205	41.09
2,547,913	None	None	4,289,269	3,975,697	9,014,243	8,700,671	63.88
5,624,000	None	800,000	9,591,680	8,355,524	17,681,238	17,302,582	117.87
None	None	None	2,748,346	2,654,183	3,664,846	3,570,683	36.38
75,000	None	None	3,092,830	2,881,767	3,985,655	4,160,090	12.42
711,144,286	$478,679,600	$578,652,684	$1,245,384,024	$1,158,652,828	$3,917,697,948	$3,987,150,426	$48.26

	Total Payrolls 1945	Total Payrolls 1944	Rated Ingot Capacity Net Tons 1945	Rated Ingot Capacity Net Tons 1944	Ingot Production Net Tons 1945	Ingot Production Net Tons 1944	Steel Operating Rate Per Cent 1945	Steel Operating Rate Per Cent 1944	Net I Inc 194
3	$786,721,918	$914,341,158	28,813,200	32,307,000	26,478,949	30,814,648	82.0	94.7	$2.1
3	625,887,729	848,949,518	12,900,000	12,900,000	11,831,610	13,262,348	91.7	102.8	2.9
	169,212,896	180,323,772	8,900,000	8,380,000	7,545,825	8,400,426	79.2	99.8	1.2
2	111,200,254	120,257,509	5,024,400	5,024,400	4,421,112	5,056,072	88.0	101.0	1.8
1	68,869,225	68,164,699	4,002,000	4,042,000	3,754,434	4,299,527	93.8	106.4	2.0
1	72,812,293	68,724,131	3,900,000	3,900,000	NA	NA	NA	NA	NA
7	59,929,238	57,452,840	3,400,000	3,400,000	3,507,686	3,684,147	103.2	108.4	2.8
5	70,868,905	64,786,517	3,237,000	3,280,000	2,992,020	3,040,014	92.6	92.7	3.1
4	54,132,892	51,441,380	1,960,000	1,960,000	1,876,906	2,012,026	95.7	102.6	2.1
0	61,600,000	76,600,000	1,392,660	1,392,660	NA	NA	NA	NA	NA
3	24,602,007	24,320,682	1,268,640†§	1,131,218	1,255,406	1,294,594	98.9	114.4	1.5
0	22,563,460	23,750,066	1,072,000	1,072,000	809,272	919,139	75.4	85.7	0.8
3	15,801,235	18,600,208	624,000	624,000	644,453	646,602	103.3	103.6	4.2
3	5,914,229	5,426,707	578,200	703,200	392,351	488,224	67.9	69.4	0.1
0	13,015,262	10,195,710	636,000*§	636,000*§	582,126	596,758	91.5	93.8	1.7
3	8,061,988#§	8,799,428#§	550,000	550,000	444,488	534,230	80.8	97.1	0.6
7	17,981,141	26,078,730	NA	NA	179,123	314,714	NA	NA	10.0
3	34,663,373	37,329,794	460,360	459,360	381,600	410,194	82.9	89.3	8.8
4	8,125,878	8,130,196	364,000	364,000	354,380	364,578	97.4	100.0	1.7
1	4,331,618	4,121,606	326,025	326,025	271,952	298,836	83.4	91.7	1.1
2	3,411,070	4,077,549	336,000	336,000	252,181	270,127	75.1	80.4	0.1
5	6,199,077	6,136,327	302,400	302,400	283,643	305,060	93.8	100.9	5.7
0	5,210,807	5,264,782	141,120	141,120	NA	NA	NA	NA	NA
	NA	NA	150,000	150,000	NA	NA	NA	NA	NA
0	9,976,506	10,929,288	100,750	100,750	75,276	108,095	74.7	107.3	3.9
5	3,330,633	3,191,068	321,000	321,000	240,604	227,332	75.0	70.8	0.9
0	$2,264,423,634	$2,647,393,665	80,759,755	83,803,133	68,575,397	77,347,691	91.0	98.5	$2.2

§*Estimated refund based on carry-back.

†Taxes for last six months figured according to the Revenue Act of 1945 because the company's fiscal year ends June 30.

††Dividends paid per share on prior preference stock were $6 in 1945 and $6 in 1944.

†*1944 figures adjusted to reflect accelerated amortization of war emergency facilities, provision for retroactive wages in 1944, and resulting reduction in federal taxes.

"Net Income Before Dividends" columns and totals do not take into consideration requirements (not actual payments) for preferred dividends. In computing earnings per common share these totals, adjusted for preferred dividend requirements, are used. In arriving at earnings per common share for individual companies the same method is followed.

Boldface type is used under those columns in which figures from all 26 companies were not available.

PER CENT EARNED ON CAPI

1928	6.55	1934	
1929	9.88	1935	
1930	4.54	1936	
1931	0.40	1937	
1932	*2.85	1938	
1933	*0.90	1939	

*Loss.

e Steel Industry for 1945

ions on federal taxes, renegotiation, reductions in reserve for contingencies, and accelerated depreciation.

resenting 87.88 Per Cent of Steelmaking Capacity

Capitalization Per Ton Ingot Capacity		Total Income Before Dividends and Interest on Bonds		Per Cent Total Income On Capitalization		Net Sales		Net Profit Margin Per Cent		Net Income Before Dividends	
1945	1944	1945	1944	1945	1944	1945	1944	1945	1944	1945	1944
$52.22	$47.08	$61,515,709	$65,770,956	4.09	4.32	$1,747,338,661	$2,082,186,895	3.32	2.92	$58,015,056	$60,791
49.81	52.17	49,232,667	43,089,799	7.66	6.40	1,326,563,896	1,746,733,127	2.63	2.07	34,947,116	36,167
36.16	40.45	13,358,587†	14,203,507†	3.98	4.19	497,675,322	527,903,507	1.92	1.92	9,543,443	10,130
45.81	45.78	9,063,600	9,748,166	3.94	4.24	284,741,818	290,087,850	2.84	2.75	8,082,082	7,966
49.01	55.45	10,455,762	10,125,050	5.33	4.52	230,399,216	238,816,965	3.26	3.33	7,512,250	7,944
53.26	56.42	13,510,900	12,475,922	6.50	5.67	271,832,560	252,357,463	4.09	4.26	11,117,764	10,751
45.00	44.73	11,394,414	11,282,638	7.45	7.42	217,386,432	221,161,942	4.54	4.63	9,861,210	10,249
52.20	47.15	10,501,039#	7,871,916 #	6.21#	5.09#	220,144,648	200,818,944	4.28#	3.64#	9,414,647 #	7,307
61.22	62.65	4,966,882	5,545,725	4.14	4.52	143,154,065	135,144,446	2.76	3.24	3,950,252	4,384
58.83	57.31	5,243,724	4,366,426	6.40	5.47	141,613,117	184,536,021	3.39	2.13	4,813,387	3,926
31.47	34.76	2,454,078	2,223,821	6.32	5.66	57,171,800	56,192,152	3.42	2.98	1,954,979	1,672
44.22	45.66	258,360°	1,152,710	0.54°	2.35	53,604,417	59,717,008	1.32°	1.13	709,442°	672
23.29	20.52	2,791,937	449,951	19.21	3.51	45,243,988	54,576,770	6.08	0.69	2,751,478	375
32.86	27.19	152,945	359,447	1.15	2.40	18,877,954	21,733,505	0.36	1.12	68,288	242
17.08°†	31.68°†	1,074,766	1,108,792	4.25	5.50	40,602,577	35,335,389	2.53	3.03	1,029,074	1,070
28.64	28.50	307,738	136,991	1.95	0.87	26,057,553	28,638,012	1.18	0.48	307,738	136
NA	NA	1,805,895	2,507,450	9.18	13.16	NA	NA	NA	NA	1,805,895	2,507
69.04	67.33	3,379,369	3,607,814	10.63	11.67	100,401,059	107,396,149	3.37	3.36	3,379,369	3,607
32.42	34.04	627,460	540,911	5.32	4.37	23,564,277	22,474,066	2.60	2.26	612,543	508
21.60	21.44	333,750	331,778	4.70	4.70	15,158,127	14,663,022	2.10	2.20	320,312	318
11.24	11.16	35,916°	96,744	0.96°	2.58	10,575,837	14,347,396	0.34°	0.67	35,916°	96
41.09	39.44	1,623,223	1,528,034	13.06	12.81	21,169,892	22,018,362	7.67	6.94	1,623,223‡	1,528
63.88	61.65	313,572	74,845°	3.48	0.86°	16,474,696	14,524,238	1.90	0.52°	313,572	74
117.87	115.35	1,055,126	1,441,217	5.97	8.33	18,232,364	24,417,630	5.79	5.90	1,055,126	1,441
36.38	35.44	295,792	254,886	8.07	7.17	23,529,446	25,336,710	1.26	1.01	295,792	256
12.42	12.98	234,269	281,721	5.88	6.77	12,770,496	12,283,834	1.69	2.01	216,313	247
$48.26	$47.35	$205,398,928	$200,427,527	5.24	5.02	$5,564,284,218	$6,393,401,433	3.06	2.68	$172,245,551	$174,228

te	Net Income Per Ton Ingots Produced		Net Income Per Ton Ingot Capacity		Federal Income Taxes		Total Assets		Current Assets		Current Li
4	1945	1944	1945	1944	1945	1944	1945	1944	1945	1944	1945
7	$2.19	$1.97	$2.01	$1.88	$30,000,000	$65,000,000	$1,890,768,775	$2,065,707,328	$817,760,584	$887,223,754	$217,000,332
8	2.95	2.73	2.71	2.80	12,200,000	98,200,000	880,879,749	1,031,914,197	514,150,099	589,654,316	174,806,320
8	1.26	1.21	1.03	1.21	15,952,608	31,400,000	398,157,355	397,331,026	189,218,793	174,197,587	49,216,791
0	1.83	1.58	1.61	1.59	3,367,000††	1,855,000	276,076,828	285,402,277	124,188,198	121,851,623	34,917,181
4	2.00	1.85	1.88	1.97	6,500,000	11,375,000	230,793,828	253,933,188	123,588,007	132,909,490	22,698,582
.	NA	NA	2.85	2.76	16,000,000	17,200,000	249,873,625	263,881,714	105,085,479	95,641,528	26,219,652
4	2.81	2.78	2.90	3.01	8,245,208	17,560,000	182,046,097	184,723,979	102,312,148	93,759,506	18,649,582
7	3.15#	2.40#	2.91#	2.23#	10,424,740#	5,448,738#	206,968,842	189,781,318	113,213,959	90,523,080	32,010,453
3	2.10	2.18	2.02	2.24	3,420,000	4,818,000	133,139,501	135,884,300	62,603,100	59,637,468	11,410,520
.	NA	NA	3.46	2.82	None	17,865,307	95,210,596	107,568,696	61,467,376	63,064,893	10,493,249
4	1.56	1.29	1.54	1.48	1,516,400§	1,651,820§	53,371,685	54,756,616	23,107,541	23,069,951	9,482,577
7	0.88°	0.73	0.66°	0.62	4,280,000##	115,000##	55,419,028	56,795,234	28,119,799	23,666,667	7,031,617
3	4.27	0.58	4.41	0.60	2,410,000§°	579,851	21,028,453	23,745,246	12,480,929	13,824,169	4,910,406
4	0.17	0.50	0.12	0.34	75,000	350,360	15,660,426	20,636,856	6,591,032	11,629,307	2,124,299
3	1.77	1.79	1.62	1.68	2,545,700	2,250,000	32,414,183	24,729,243	19,662,207	15,767,981	5,877,952
.	0.69	0.26	0.56	0.25	195,857##	71,000##	18,410,456	18,496,436	9,425,037	8,540,117	2,118,821
	10.08	7.97	NA	NA	1,700,000	6,326,514	25,936,909	34,836,311	19,644,372	26,663,891	2,454,623
3	8.86	8.80	7.34	7.85	7,851,096	9,447,048	43,006,707	44,185,214	31,008,715	26,194,641	10,029,382
0	1.73	1.40	1.68	1.40	495,000	350,000	14,579,075	15,561,534	7,416,775	8,282,292	1,627,808
7	1.18	1.07	0.98	0.98	195,000	312,000	8,157,137	8,527,892	4,312,027	4,454,790	818,633
4	0.14°	0.36	0.11°	0.29	None	73,165	4,722,790	4,163,022	2,788,593	2,261,056	937,023
0	5.72	5.01	5.37	5.05	2,514,000‡	2,988,078	13,254,122	12,827,800	6,046,000	4,895,555	670,242
	NA	NA	NA	NA	170,000	None	10,583,699	10,374,673	5,316,703	4,567,911	1,452,181
	NA	NA	7.03	9.61	NA	1,480,500	20,636,719	19,925,141	8,122,174	6,983,483	2,698,845
3	3.93	2.37	2.94	2.54	788,,943	785,395	5,141,343	7,291,992	3,306,940	4,698,734	1,276,497
3	0.90	1.09	0.67	0.77	452,000	406,106	5,714,770	5,786,745	2,434,015	2,313,379	1,226,354
5	$2.25	$2.04	$2.11	$2.05	$110,792,838	$297,536,882	$4,891,952,698	$5,278,767,978	$2,403,370,602	$2,496,277,169	$652,159,922

NED ON CAPITALIZATION

	0.36	1940	7.57
	2.09	1941	7.87
	4.40	1942	5.69
	6.07	1943	5.22
	0.59	1944	5.02
	4.27	1945	5.24

the Steel Industry for 1945

ack provisions on federal taxes, renegotiation, reductions in reserve for contingencies, and accelerated depreciation.

, Representing 87.88 Per Cent of Steelmaking Capacity

	Capitalization Per Ton Ingot Capacity		Total Income Before Dividends and Interest on Bonds		Per Cent Total Income On Capitalization		Net Sales		Net Pr Per
44	1945	1944	1945	1944	1945	1944	1945	1944	1945
,920,829	$52.22	$47.08	$61,515,709	$65,770,956	4.09	4.32	$1,747,338,661	$2,082,186,895	8.32
,030,435	49.81	52.17	49,232,667	43,089,799	7.66	6.40	1,326,563,896	1,746,733,127	2.63
,951,038	36.16	40.45	13,358,587†	14,203,507†	3.98	4.19	497,675,322	527,903,507	1.92
,019,155	45.81	45.78	9,063,600	9,748,166	3.94	4.24	284,741,818	290,087,880	2.84
,148,330	49.01	55.45	10,455,762	10,125,050	5.33	4.52	230,399,216	238,816,965	3.26
,036,800	53.26	56.42	13,510,900	12,475,922	6.50	5.67	271,832,560	252,357,463	4.09
,088,191	45.00	44.73	11,394,414	11,282,638	7.45	7.42	217,386,432	221,161,942	4.54
,655,556	52.20	47.15	10,501,039#	7,871,916#	6.21#	5.09#	220,144,648	200,818,944	4.28#
,800,573	61.22	62.65	4,966,882	5,545,725	4.14	4.52	143,154,065	135,144,446	2.76
,816,812	58.83	57.31	5,243,724	4,366,426	6.40	5.47	141,613,117	184,536,021	3.39
,323,467	31.47	34.76	2,454,078	2,223,821	6.32	5.66	57,171,800	56,192,152	3.42
,951,585	44.22	45.66	258,360*	1,152,710	0.54*	2.35	53,604,417	59,717,008	1.32*
,806,604	23.29	20.52	2,791,937	449,951	19.21	3.51	45,243,988	54,576,770	6.08
,996,562	32.86	27.19	152,945	859,447	1.15	2.40	18,877,954	21,733,505	0.36
,149,521	17.08*†	31.68*†	1,074,766	1,108,792	4.25	5.50	40,602,577	35,335,389	2.53
,677,695	28.64	28.50	307,738	136,991	1.95	0.87	26,057,553	28,638,012	1.18
,057,538	NA	NA	1,805,895	2,507,450	9.18	13.16	NA	NA	NA
,927,284	69.04	67.33	3,379,369	3,607,814	10.63	11.67	100,401,059	107,396,149	3.37
,390,660	32.42	34.04	627,460	540,911	5.32	4.37	23,564,277	22,474,066	2.60
,991,317	21.60	21.44	333,750	331,778	4.70	4.70	15,158,127	14,663,022	2.10
,750,243	11.24	11.16	35,916*	96,744	0.96*	2.58	10,575,837	14,347,396	0.34*
,926,205	41.09	39.44	1,623,223	1,528,034	13.06	12.81	21,169,892	22,018,362	7.67
,700,671	63.88	61.65	313,572	74,845*	3.48	0.86*	16,474,696	14,524,238	1.90
,302,582	117.87	115.35	1,055,126	1,441,217	5.97	8.33	18,232,364	24,417,630	5.79
,570,683	36.38	35.44	295,792	254,886	8.07	7.17	23,529,446	25,336,710	1.26
,160,090	12.42	12.98	234,269	281,721	5.88	6.77	12,770,496	12,283,834	1.69
,150,426	$48.26	$47.35	$205,398,928	$200,427,527	5.24	5.02	$5,564,284,218	$6,393,401,433	3.06

Operating Rate Per Cent	Net Income Per Ton Ingots Produced		Net Income Per Ton Ingot Capacity		Federal Income Taxes		Total Assets		Cu
1944	1945	1944	1945	1944	1945	1944	1945	1944	1945
94.7	$2.19	$1.97	$2.01	$1.88	$30,000,000	$65,000,000	$1,890,768,775	$2,065,707,328	$817,760,584
102.8	2.95	2.73	2.71	2.80	12,200,000	98,200,000	880,879,749	1,031,914,197	514,150,099
99.8	1.26	1.21	1.03	1.21	15,952,608	31,400,000	398,157,355	397,331,026	189,218,793
101.0	1.83	1.58	1.61	1.59	3,367,000††	1,855,000	276,076,828	285,402,277	124,188,198
106.4	2.00	1.85	1.88	1.97	6,500,000	11,375,000	230,793,828	253,933,188	123,588,007
NA	NA	NA	2.85	2.76	16,000,000	17,200,000	249,873,625	263,881,714	105,085,479
108.4	2.81	2.78	2.90	3.01	8,245,208	17,560,000	182,046,097	184,723,979	102,312,148
92.7	3.15#	2.40#	2.91#	2.23#	10,424,740#	5,448,738#	206,968,842	189,781,318	113,213,959
102.6	2.10	2.18	2.02	2.24	3,420,000	4,818,000	133,139,501	135,884,300	62,603,100
NA	NA	NA	3.46	2.82	None	17,865,307	95,210,596	107,568,696	61,467,376
114.4	1.56	1.29	1.54	1.48	1,516,400§	1,651,820§	53,371,685	54,756,616	23,107,541
85.7	0.88*	0.73	0.66*	0.62	4,280,000##	115,000##	55,419,028	56,795,234	28,119,799
103.6	4.27	0.58	4.41	0.60	2,410,000§*	579,851	21,028,453	23,745,246	12,480,929
69.4	0.17	0.50	0.12	0.34	75,000	350,360	15,660,426	20,636,856	6,591,032
93.8	1.77	1.79	1.62	1.68	2,545,700	2,250,000	32,414,183	24,729,243	19,662,207
97.1	0.69	0.26	0.56	0.25	195,857##	71,000##	18,410,456	18,496,436	9,425,037
NA	10.08	7.97	NA	NA	1,700,000	6,326,514	25,936,909	34,836,311	19,644,372
89.3	8.86	8.80	7.34	7.85	7,851,096	9,447,048	43,006,707	44,185,214	31,008,715
100.0	1.73	1.40	1.68	1.40	495,000	350,000	14,579,075	15,561,534	7,416,775
91.7	1.18	1.07	0.98	0.98	195,000	312,000	8,157,137	8,527,892	4,312,027
80.4	0.14*	0.36	0.11*	0.29	None	73,165	4,722,790	4,163,022	2,788,593
100.9	5.72	5.01	5.37	5.05	2,514,000†	2,988,078	13,254,122	12,827,800	6,046,000
NA	NA	NA	NA	NA	170,000	None	10,583,699	10,374,673	5,316,703
NA	NA	NA	7.03	9.61	NA	1,480,500	20,636,719	19,925,141	8,122,174
107.3	3.93	2.37	2.94	2.54	788,,943	785,395	5,141,343	7,291,992	3,306,940
70.8	0.90	1.09	0.67	0.77	452,000	406,106	5,714,770	5,786,745	2,434,015
98.5	$2.25	$2.04	$2.11	$2.05	$110,792,838	$297,536,882	$4,891,952,698	$5,278,767,978	$2,403,370,602

ENT EARNED ON CAPITALIZATION

1934	0.36	1940	7.57
1935	2.09	1941	7.87
1936	4.40	1942	5.69
1937	6.07	1943	5.22
1938	0.59	1944	5.02
1939	4.27	1945	5.24

Net Profit Margin Per Cent		Net Income Before Dividends		Preferred Dividend Requirements		
1945	1944	1945	1944	1945	1944	
6.32	2.92	$58,015,056	$60,791,281	$25,219,677	$25,219,677	.....United States Steel Corp.
2.63	2.07	34,947,116	36,167,723	6,537,209	6,537,209	.....Bethlehem Steel Corp.
1.92	1.92	9,543,443	10,130,296	1,832,817	1,973,046	.....Republic Steel Corp.
2.84	2.75	8,082,082	7,966,663	2,267,910	2,934,110	..‡°Jones & Laughlin Steel Corp.
3.26	3.33	7,512,250	7,944,922	618,750	825,000	....Youngstown Sheet & Tube Co.
4.09	4.26	11,117,764	10,751,369	None	None	.....National Steel Corp.
4.54	4.63	9,861,210	10,249,395	None	None	.....Inland Steel Co.
4.28#	3.64#	9,414,647#	7,307,991#	2,024,736	2,024,734	.....American Rolling Mill Co.
2.76	3.24	3,950,252	4,384,789	1,815,830	1,815,830	.....Wheeling Steel Corp.
3.39	2.13	4,813,387	3,926,893	1,583,505	1,602,100	....Crucible Steel Co. of America
3.42	2.98	1,954,979	1,672,061	None	None	....#°Colorado Fuel & Iron Corp.
1.32°	1.13	709,442°	672,364	863,762	863,480	.....Pittsburgh Steel Co.
6.08	0.69	2,751,478	375,939	None	None	.....Lukens Steel Co.
0.36	1.12	68,288	242,386	None	None	.....Granite City Steel Co.
2.53	3.03	1,029,074	1,070,323	298,600	298,600	.....Sharon Steel Corp.
1.18	0.48	307,738	136,991	502,768	502,768	.....Alan Wood Steel Co.
NA	NA	1,805,895	2,507,450	None	None	..... Midvale Co.
3.37	3.36	3,379,369	3,607,814	None	198,380	....Allegheny Ludlum Steel Corp.
2.60	2.26	612,543	508,661	None	None	.....Continental Steel Corp.
2.10	2.20	320,312	318,966	None	None	.....Laclede Steel Co.
0.34°	0.67	35,916°	96,744	None	None	.....Central Iron & Steel Co.
7.67	6.94	1,623,223‡	1,528,034	None	None	.....Keystone Steel & Wire Co.
1.90	0.52°	313,572	74,845°	127,395	127,395	.....†°Follansbee Steel Corp.
5.79	5.90	1,055,126	1,441,217	390,651	393,927	.....°#A. M. Byers Co.
1.26	1.01	295,792	256,155	None	None	.....Harrisburg Steel Corp.
1.69	2.01	216,313	247,098	5,250	5,250	$#Northwestern Steel & Wire Co.
3.06	2.68	$172,245,551	$174,228,680	$44,088,860	$45,321,506	.....Total (or average)

Current Assets		Current Liabilities		Ratio of Current Assets To Current Liabilities		
1945	1944	1945	1944	1945	1944	
$817,760,584	$887,223,754	$217,000,332	$337,870,571	3.77—1	2.63—1	.....United States Steel Corp.
514,150,099	589,654,316	174,806,320	300,068,192	2.94—1	1.97—1	.....Bethlehem Steel Corp.
189,218,793	174,197,587	49,216,791	43,499,318	3.84—1	4.00—1	.....Republic Steel Corp.
124,188,198	121,851,623	34,917,181	42,814,675	3.56—1	2.85—1	..‡°Jones & Laughlin Steel Corp.
123,588,007	132,909,490	22,698,582	17,788,334	5.44—1	7.47—1	....Youngstown Sheet & Tube Co.
105,085,479	95,641,528	26,219,652	29,648,009	4.00—1	3.20—1	.....National Steel Corp.
102,312,148	93,759,506	18,649,582	21,853,026	5.50—1	4.30—1	.....Inland Steel Co.
113,213,959	90,523,080	32,010,453	26,235,867	3.54—1	3.45—1	.....American Rolling Mill Co.
62,603,100	59,637,468	11,410,520	10,662,944	5.49—1	5.59—1	.....Wheeling Steel Corp.
61,467,376	63,064,893	10,493,249	18,526,092	5.86—1	3.40—1	....Crucible Steel Co. of America
23,107,541	23,069,951	9,482,577	8,418,180	2.43—1	2.74—1	....#°Colorado Fuel & Iron Corp.
28,119,799	23,666,667	7,031,617	6,974,504	4.00—1	3.39—1	.....Pittsburgh Steel Co.
12,480,929	13,824,169	4,910,406	8,509,773	2.54—1	1.62—1	.....Lukens Steel Co.
6,591,032	11,629,307	2,124,299	5,280,553	3.10—1	2.20—1	.....Granite City Steel Co.
19,662,207	15,767,981	5,877,952	3,654,722	3.35—1	4.31—1	.....Sharon Steel Corp.
9,425,037	8,540,117	2,118,821	2,003,910	4.45—1	4.26—1	.....Alan Wood Steel Co.
19,644,372	26,663,891	2,454,623	11,914,293	8.00—1	2.24—1	..... Midvale Co.
31,008,715	26,194,641	10,029,382	12,527,721	3.09—1	2.09—1	....Allegheny Ludlum Steel Corp.
7,416,775	8,282,292	1,627,808	2,159,982	4.60—1	3.80—1	.....Continental Steel Corp.
4,312,027	4,454,790	818,633	1,226,575	5.27—1	3.63—1	.....Laclede Steel Co.
2,788,593	2,261,056	937,023	367,917	2.98—1	6.15—1	.....Central Iron & Steel Co.
6,046,000	4,895,555	670,242	754,077	9.02—1	6.49—1	.....Keystone Steel & Wire Co.
5,316,703	4,567,911	1,452,181	1,571,633	3.66—1	2.91—1	.....†°Follansbee Steel Corp.
8,122,174	6,983,483	2,698,845	2,317,908	3.00—1	3.02—1	.....°#A. M. Byers Co
3,306,940	4,698,734	1,276,497	3,521,309	2.59—1	1.33—1	.....Harrisburg Steel Corp.
2,434,015	2,313,379	1,226,354	1,522,892	2.00—1	1.50—1	$#Northwestern Steel & Wire Co.
2,403,370,602	$2,496,277,169	$652,159,922	$921,692,977	3.68—1	2.71—1	.....Total (or average)

Van Norman Co. Acquires Morse Twist Drill Co.

John Y. Scott is president of both firms. Facilities to be increased at Morse plant at New Bedford, Mass.

MORSE Twist Drill & Machine Co., New Bedford, Mass., has been acquired by the Van Norman Co., Springfield, Mass., and John Y. Scott, president of Van Norman Co., has been elected president.

Other officers of the Morse company are James A. Wright, vice president and general manager; E. C. Adams, vice president and general sales manager, and L. H. Stanton, treasurer.

William T. Reid, former president, Morse Twist Drill & Machine Co., continues with the organization as director and management adviser. Other members of the board of directors include the above officers, L. F. Handrup and R. W. Porter.

The Morse plant will continue to be operated at New Bedford and facilities will be increased for the production of twist drills, reamers, gages, dies, taps, milling cutters and machinist tools. These will supplement Van Norman tools which include milling machines, radius grinders, and automobile repair service equipment, brake turning lathes, piston grinders, crankshaft regrinders and boring machines.

New Division Organized By Climax Fire Brick Co.

Organization of a Refractory Specialties Division of Climax Fire Brick Co., Pittsburgh, was announced recently. The new division is producing high temperature cements, castable refractories and plastic fire brick. Already in operation, the division has been making shipments for the past several months.

Construction of a new laboratory and installation of production machinery is in progress to expand this division and the other departments of the plant at Climax, Pa.

Heading the specialties division is D. M. Beam, assistant general manager of the company, according to Harry P. Barrand, executive vice president and general manager. Mr. Beam was formerly manager, specialties department, National Refractories Co., Philadelphia.

RELIEF ASSOCIATION: Fifty-three charter members of the Relief Association Employees of Heppenstall Co., Bridgeport, Conn., still are active in the group 18 years after its organization. Shown are officers at the group's recent eighteenth anniversary; left to right: Harvey Callis, president; Gene Graze, Ray DuHaine, James Grant, and Henry DuBret; Standing: Allan Sherman and Acky Bergman

BRIEFS . . .

Paragraph mentions of developments of interest and significance within the metalworking industry

Eastern Stainless Steel Corp., Baltimore, has announced plans for construction of a new 4-high cold reduction mill.

—o—

Manhattan Rubber Division, Passaic, N. J., Raybestos-Manhattan Inc., has appointed Republic Supply Co. of California as distributor of industrial rubber products in California.

—o—

Coulter-Sibbert Steel Co., Los Angeles, has opened a new warehouse at 5524 Alcoa Ave., Los Angeles 11.

—o—

S. P. Kinney Engineers Inc., Pittsburgh, has appointed Reiter Engineering Co. Inc., Philadelphia, as sales agent for the Philadelphia district.

—o—

Fedders Mfg. Co. Inc., Buffalo, has changed its name to Fedders-Quigan Corp.

—o—

Estate Stove Co., Hamilton, O., recently purchased by Noma Electric Corp., New York, has announced reorganization and an expansion program which, when completed by the end of the year, will double the stove company's capacity.

—o—

International Nickel Co. Inc., New York, has made a 2800 square foot blueprint photo mural on the use of nickel alloy castings which will be displayed on the stage of Cleveland's Auditorium during the Foundry show, May 6-10.

—o—

Ferguson Machine & Tool Co. Inc., St. Louis, has moved to 471 Paul Ave., Ferguson Station, St. Louis 21.

Rockwell Manufacturing Acquires A. H. Ross Co.

Purchase of A. H. Ross Co., Ludlow, Ky., manufacturer of packaging machinery, by Rockwell Mfg. Co., Pittsburgh, has been announced by Col. Willard F. Rockwell, chairman and president of the latter company. Plans are being made for considerable expansion of production in the Ross plant.

Dreifus Steel Co. Opens Warehouse on Long Island

Dreifus Steel Co., Philadelphia, noted in the Apr. 15 issue of STEEL, p. 67, as having been organized to do a jobbing business in new steel, is establishing a warehouse at 18-19 Flushing Ave., Long Island City, N. Y. Other warehousing facilities are expected to be established later.

The company, located at 615 Philadelphia Savings Bank Bldg., Philadelphia, is a subsidiary of Charles Dreifus Co., Philadelphia.

Coast Expansion Seen Spurred Should Price Control Be Eased

Many companies reported holding expansion plans in abeyance pending lifting of government restrictions. March construction report shows plans on file in northern California for 92 plants

SAN FRANCISCO

CONGRESSIONAL easing of price control regulations may set in motion a flurry of industrial expansion on the West Coast, it is believed by many observers here.

They reason like this: A large number of companies, both local corporations and those with headquarters in the East and Midwest, have been surveying the Coast for expansion possibilities in recent months. However, so long as government restrictions on prices, and hence on profit margins, were in effect, many plans have been kept in abeyance until a more propitious time. If the Senate agrees to House amendments in the Price Control Act, it is believed construction projects will go forward even more rapidly than in the last few months.

Although there now are restrictions on commercial building, under the Wyatt program, the policies set by the Civilian Production Administration regional office here on approval of new buildings indicate that the order will not be a serious deterrent to construction. The CPA office has been giving its liberal approval to factories and commercial structures which qualify as being essential. Essentiality in many cases has been measured by the extent of employment the new expansions or new buildings would create. Up to now virtually all the projects not given permission have been those of highly nonessential character, such as amusement places.

As a result of CPA's interpretation of the building order, new construction in April in this area probably was at levels equal to earlier months of the year. Construction has been expanding rapidly since the end of the war.

For example, the San Francisco Chamber of Commerce report on March expansions, just issued, shows plans were filed in northern California for 92 new plants to cost $6,518,000. In addition, expansions of 66 existing plants were announced during the month for a total outlay of $4,798,000. Combined, these new projects total 158 with an aggregate value of $11,316,000.

Compared with March, 1945, these expenditures represent a gain of more than $5,000,000, and were $1,000,000 greater than in February, 1946.

In terms of new jobs to be created, the gage used frequently by the CPA, the March projects will provide work for nearly 700 persons.

From Jan. 1, 1946, to Apr. 1 new plants and expansions in northern California have numbered 370 projects with a total estimated expenditure of $29,963,800. These totals compare with 140 projects valued at $18,335,700 in the similar 1945 period.

Kaiser Co. Inc., in Oakland, has been informed of discovery of a "tremendous" deposit of high quality alumina clay near Spokane. The Kaiser Co. recently acquired two aluminum plants from the government at Spokane.

The clay deposit was investigated jointly by the U. S. Bureau of Mines and the Geological Survey. According to Dr. Vernon E. Scheid, of the Geological Survey, the clay also has the unusual advantage of containing a high percentage of titanium oxide used in making paints and other products.

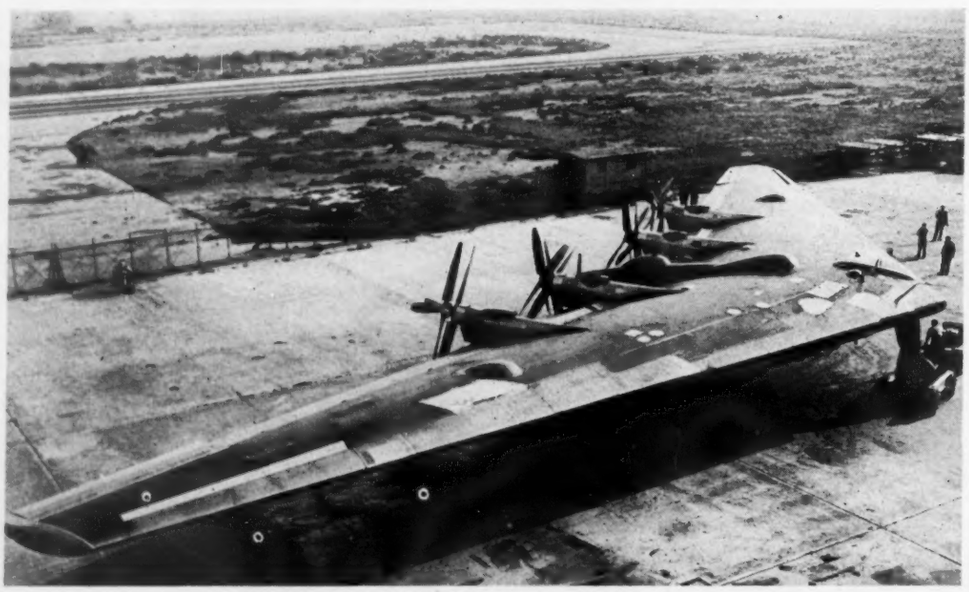
It is estimated that the deposit contains about 12½ million tons of ore which averages 28.7 alumina and 5.6 per cent available iron oxide.

Press for Railroad Access To Freeways in California

LOS ANGELES

Eastern manufacturers who have invested in land in the Los Angeles area with the ultimate aim of erecting industrial structures when conditions of supply permit asked the Chamber of Commerce there to campaign for railroad access to freeways along routes which will one day web the entire area.

More than 75 per cent of industrial land buying has been along routes of



"FLYING WING": Workmen prepare the Northrop Flying Wing XB-35 for its initial flight at Hawthorne, Calif. The unorthodox plane, shaped like a gigantic boomerang with no regular fuselage or tail surfaces, is powered with four Pratt & Whitney Wasp Major engines, turning eight 4-bladed coaxial pusher propellers. NEA photo

proposed freeways around Los Angeles, the chamber industrial department disclosed last week.

George J. O'Brien, head of the chamber's industrial development committee, reported that the highway department of California will be asked to lay out future roadways and freeways with an eye to rail access.

In most cases in the past, he said, this policy has been adhered to, with a few exceptions that have given rise to the current campaign.

"Our report, to be submitted soon to the highway department, will recommend that a policy be rigidly established to protect future development of industrial areas," Mr. O'Brien said.

"The purpose is to insure location of industrial sites in places giving access to both highways and railways."

Los Angeles led all western cities in new construction last month. Permits totaled $29,838,293 for March, 1946, compared to $22,249,262 for August, 1923, the previous record month.

Second on the list of the 25 leading construction cities of the West was San Francisco, with $12,718,603 last month. Third was Long Beach, Los Angeles suburb.

Nearly 800 striking employees of the Ford Motor Co. in Long Beach, Calif., went back to work this week.

The strike, a sympathy shutdown, was called when members of the CIO United Auto Workers refused to build cars with springs supplied by a company whose workers are on strike.

Discontinuance of the strike followed conferences of local leaders with international officers of the union.

Plastics Industry Holds First National Exposition

The plastics industry held its first National Plastics Exposition at the Grand Central Palace, New York city, April 22-27, and exhibited various new products for industrial, as well as general application. Manufacturers of machinery and other steel products used by the industry were well represented.

Ronald Kinnear, chairman of the exposition committee, pointed out that production of plastics had increased from 310 million pounds in 1940 to more than 1 billion pounds today. Investment in plant and equipment, he said, has increased tenfold since 1932 and, with present demand far in excess of supply, the industry is currently expanding its material-producing facilities by the expenditure of more than $100 million.

Annual conference of the Society of the Plastics Industry was held at the Commodore Hotel, April 23-25.

Prominent Government, Business Men To Speak at NAPA Meeting

NATIONAL Association of Purchasing Agents will hold its 31st annual convention and exhibition in the Stevens Hotel, Chicago, May 27-29.

Divided into four sessions—Conditions Purchasing Agents Face in the Year Ahead, Forward to Fundamentals, Getting Production Rolling, and Some Special Opportunities — the convention will include the following speakers and their subjects: Charles L. Sheldon, president, N. A. P. A., and purchasing agent, Hood Rubber Co., Watertown, Mass., "Convert Your Problems into Opportunities;" R. C. Haberkern, vice president and purchasing agent, R. J. Reynolds Tobacco Co., Winston-Salem, N. C., "Buying Conditions Purchasing Agents Will Face in the Year Ahead;" John D. Small, administrator, Civilian Production Administration, and Paul A. Porter, administrator, Office of Price Administration, "Government Policies for the Year Ahead;" W. R. Herod, president, International General Electric Co., New York, "Management's Problems During the Year Ahead as They Affect Purchasing;" R. C. Kelly, purchasing agent, Dresser Industries Inc., Cleveland, "Successful Buying Policies in a Sellers' Market;" R. L. Van Cleve, purchasing agent, Carnegie-Illinois Steel Corp., Pittsburgh, "Material Management Today;" Fred A. Compton, purchasing agent, Detroit Edison Co., Detroit, "Escalator Clauses;" Hiland C. Batcheller, president, Allegheny Ludlum Steel Corp., Brackenridge, Pa., "Industry's Steel Needs;" R. G. Kimball, director of technical services, National Lumber Manufacturers Association, Washington, "Industry's Lumber Needs;" George M. Bryant, president, Austin Co., Cleveland, "Industry's New Construction Needs;" H. N. McGill, president, McGill Commodity Service Inc., Auburndale, Mass., "Industry's Import Needs;" George W. Romney, general manager, Automobile Manufacturers Association, Detroit, "Labor—Its Influence on Production and Costs;" George Stuart Brady, materials consultant, Washington, "Peacetime Use of War Developments;" Lt. Gen. E. B. Gregory, administrator, War Assets Administration, "Surplus Material Availability;" and S. W. MacKenzie, purchasing agent, United States Rubber Co., New York, "Purchasing Personnel—Finding and Training It."

Brown & Sharpe Alumni To Hold Reunion May 18

Apprentice graduates of Brown & Sharpe Mfg. Co., Providence, R. I., will hold a banquet and reunion at the Biltmore Hotel, Providence, May 18. Principal speaker of the evening will be James E. MacLaren, class of '18, of Buck & Hickman Ltd., Birmingham, Eng., who will speak on his experiences in the British Ministry of Supply and with the Control Commission in Germany. Toastmaster will be William H. Stewart, '17, Cleveland representative of Brown & Sharpe Co.

Calendar of Meetings . . .

May 6, Non-Ferrous Founders' Society: Annual meeting, Cleveland Athletic Club, Cleveland.

May 6-7, Association of Iron & Steel Engineers: Spring conference sponsored by the rolling mill committee, Congress Hotel, Chicago.

May 6-8, Triple Mill Supply Convention: Participating associations are: Southern Supply & Machinery Distributors Association, National Supply & Machinery Distributors Association and American Supply and Machinery Manufacturers Association. Convention will be held in Atlantic City, N. J.

May 6-10, American Foundrymen's Association: Fiftieth annual Foundry Congress and Show, Public Auditorium, Cleveland. W. W. Maloney, 222 West Adams St., Chicago, secretary.

May 7-9, National Association of Corrosion Engineers: Annual convention and corrosion exhibition, Municipal Auditorium, Kansas City, Mo. Elton Sterrett, 318 Southern Standard Bldg., Houston 2, Tex., executive secretary.

May 23, American Iron & Steel Institute: Fifty-fourth general meeting, Waldorf Astoria Hotel, New York. George S. Rose, 350 Fifth Ave., New York, is the institute's secretary.

May 23-June 2, Mid-America Exposition: Industrial exhibit of postwar home and commercial products, Public Hall, Cleveland. Headquarters are at 226 Public Hall, Cleveland.

May 29-31, Machinery Dealers' National Association: Annual meeting, Claridge Hotel, Atlantic City, N. J. R. K. Vinson, 20 North Wacker Drive, Chicago 6, executive director.

June 2-7, Society of Automotive Engineers: Semi-annual meeting, French Lick, Ind. John A. C. Warner, 29 West 39th St., New York 18, secretary and general manager.

June 3-5, American Gear Manufacturers Association: Annual meeting, The Homestead, Hot Springs, Va. Newbold C. Goin, Empire Bldg., Pittsburgh 22, executive secretary.

June 3-6, American Society of Mechanical Engineers: Aviation Division meeting, Los Angeles. C. E. Davies, 29 West 39th St., New York 18, secretary.

June 3-6, National District Heating Association: Annual meeting, The Cavalier, Virginia Beach, Va. John F. Collins Jr., 827 N. Euclid Ave., Pittsburgh 6, secretary-treasurer.

Experimental Gas

OPERATES AT 1350

Navy-Allis-Chalmers propulsion development, under test at Annapolis for past 2 years, regarded by engineers as "fourth prime mover". Background factors and features of model plant revealed for first time

RECOGNIZING the need for a gas turbine test unit capable of testing high-temperature materials under actual full-scale service conditions, the Navy's Bureau of Ships arranged in 1940 for Allis-Chalmers Mfg. Co., to design and construct a 3500 hp, experimental gas-turbine unit capable of operating at temperatures up to 1500°. Although it was installed at the Naval Engineering Experiment Station, Annapolis, in 1944, for security reasons publicity concerning the unit was restricted up until now.

To date, the unit has been under test for almost 2 years, operating at progressively increasing turbine inlet temperatures. Just recently, it satisfactorily completed a series of test runs at 1350° F, the highest operating temperatures ever reached in a stationary unit of this size, according to both the Navy and the Milwaukee firm.

Vice Admiral Earle W. Mills, USN, assistant chief of BuShips, in announcing the gas turbine development, said it ultimately may provide naval ships with a new source of propulsion power that would greatly increase their cruising range.

According to Dr. J. T. Rettaliata, former consulting engineer for gas turbines at Allis-Chalmers, and now director of the Mechanical Engineering department at the Illinois Institute of Technology, the new development has characteristics applicable for both land and marine use.

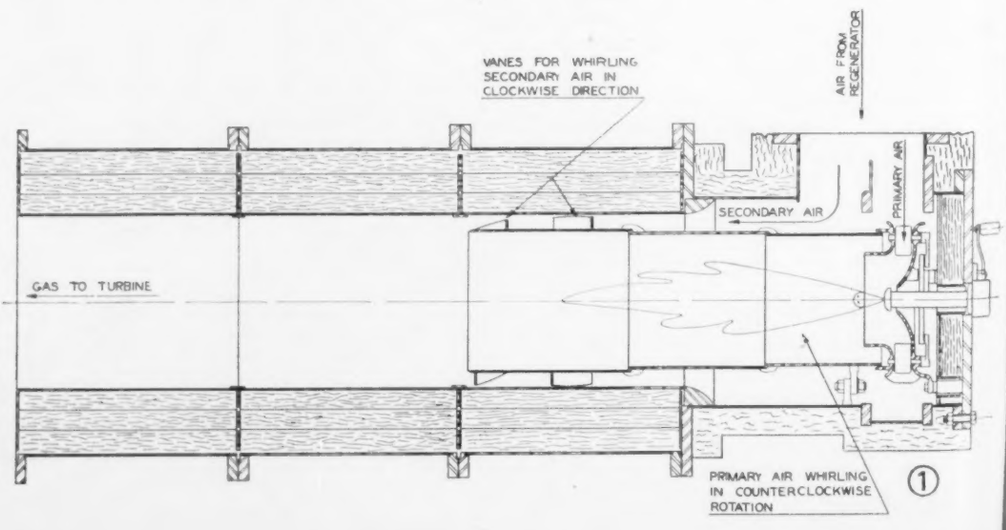
"Engineers regard it as a highly significant step in the development of what has been called the fourth prime mover—following the steam engine, steam turbine and the internal combustion engine," Dr. Rettaliata said.

The following report released by Allis-Chalmers points out background factors and some of the features of the experimental plant, explaining the problems that confronted both naval and company engineers in developing the gas turbine to its present status.

A modern high-temperature, steam plant cycle, the report said, operates with exhaust or terminal temperatures below 100° F due to the condensable property of water. Since exhaust gas from an open-cycle gas turbine cannot be condensed, it leaves the turbine from 500 to 1000° F at approximately atmospheric pressure.

Fundamental problem introduced by the higher exhaust temperature, it said, requires that the initial turbine inlet temperature adopted in the gas turbine cycle must be considerably above the present temperature of 950° F employed in steam cycles, if a worthwhile efficiency is to be achieved.

Existing application of gas turbines includes two classes of units in which an outstanding measure of success has been achieved, it pointed out. One of these is



as Turbine

350 DEGREES FAHRENHEIT

the development of gas turbines to drive air compressors for the Houdry process for cracking crude petroleum in producing high-octane gasoline. All units for this process, built in the United States, were manufactured by Allis-Chalmers, and they have operated with outstanding records for reliability throughout the war period.

During the past 8 years, under actual service conditions, the gas turbines driving the Houdry equipment operated at temperatures less than 1000° F, so field experience with these units does not provide an adequate background for constructing gas-turbine prime movers at temperatures up to the 1500° F level.

Performance of gas-turbine-driven superchargers for

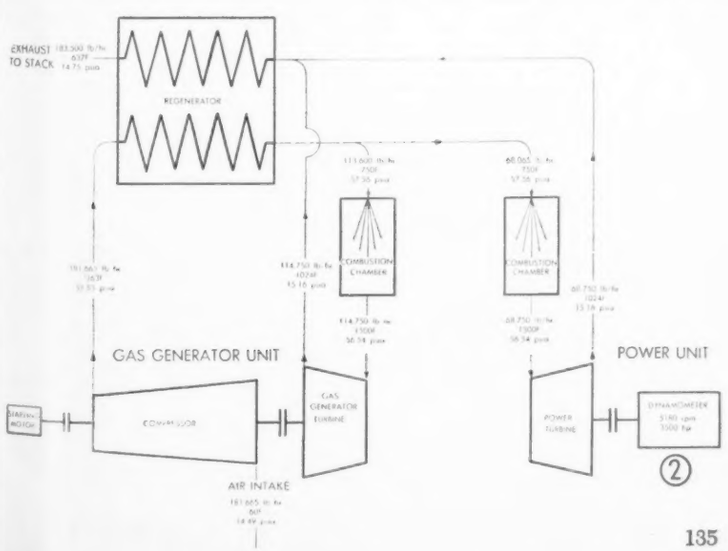
Fig. 1—Section of combustion chamber, one of two used in turbine model at Annapolis

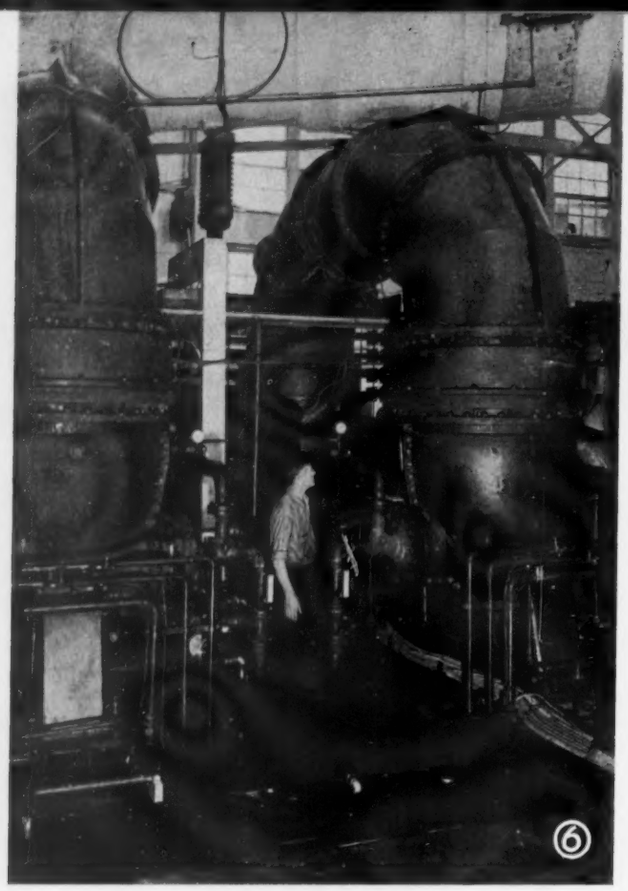
Fig. 2—Regenerative cycle of Allis-Chalmers 3500-hp gas turbine unit shows arrangement of elements. All data shown here is for full-load conditions

Fig. 3—Exhaust end of power turbine, right, is where net power output of entire experimental unit at Annapolis can be measured as it is absorbed by water brake, upper center. Intercommunication phone system permits close co-ordination of tests

Fig. 4—Atmospheric air for compressor is carried by piping, upper center, while discharge duct at left carries compressed air to regenerator. Exhaust end of gas generator turbine is seen at right.

Fig. 5—Arrangement of compressor and gas generator turbine viewed from compressor discharge end. Starting motor is at extreme left





our bombers and fighter planes during World War II is now well known history. These units operated for acceptable periods of time at an inlet temperature of 1600° F. In like manner, the gas turbines used in the jet propulsion engines have performed well at an inlet temperature of 1500° F. The gas turbines in the turbo superchargers and in the jet propulsion units are in each case designed to meet a specific military requirement in which attainment of the objective is paramount, and a relatively short service life was acceptable.

In pushing forward the commercial horizon of the gas turbine, the report stated, it is necessary that multiple-stage turbines be developed. The experimental gas turbine unit at Annapolis will supply information to guide the designers of future gas turbines for this operating temperature.

Selection of materials in the detail design of gas-turbine parts for high-temperature units built up to the present time was based on laboratory tests of materials, or on service experience with superchargers and jet propulsion engines. The Annapolis unit is supplying information on the practical service life of some of the new gas-turbine alloys in a full-scale turbine, operating at full temperature

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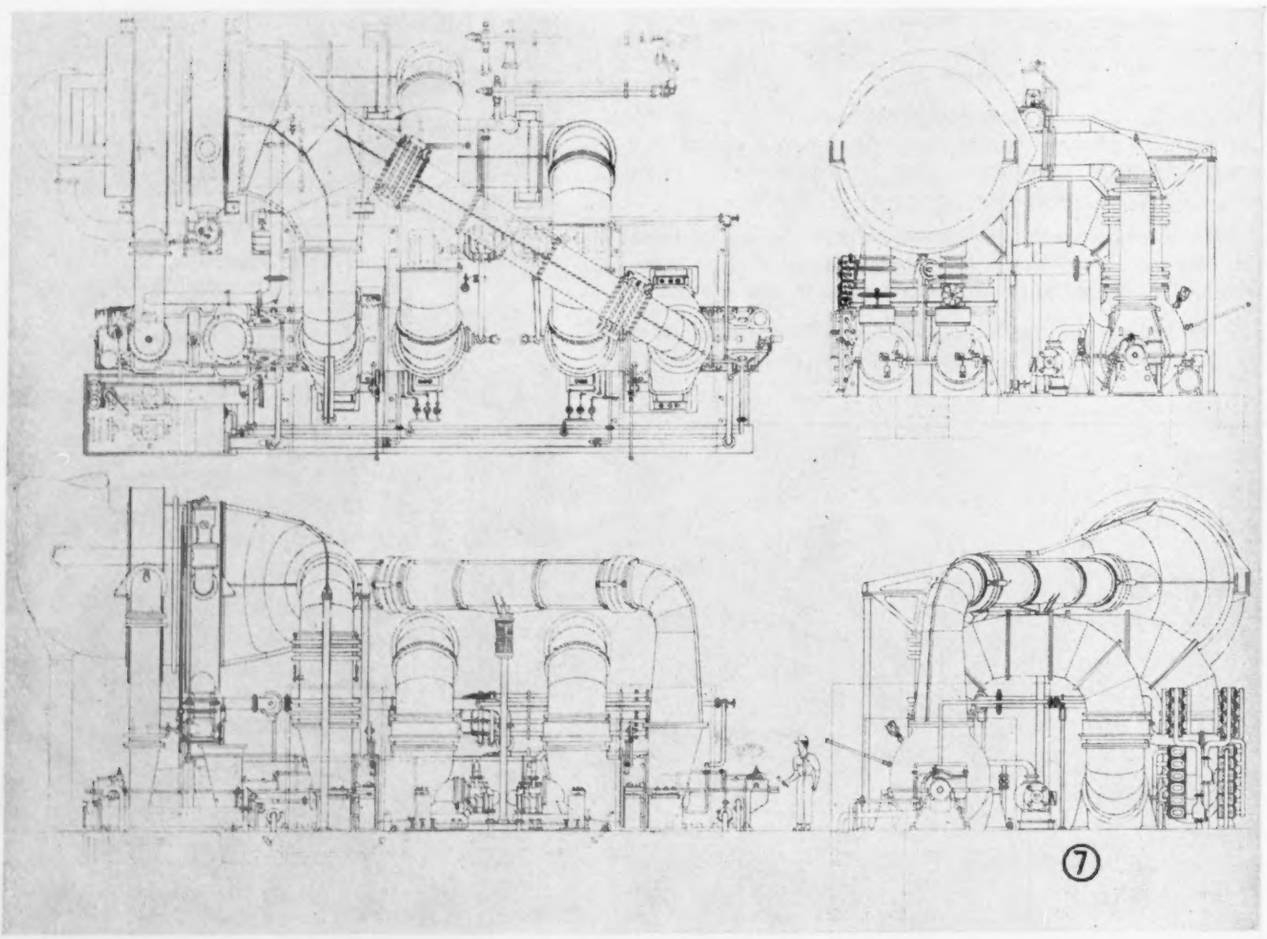
Fig. 6—This view shows inlet ducts to Allis-Chalmers gas generator turbine, left, and power turbine, right. Inlet and discharge pipes for internal cooling air can be seen beyond operator

Fig. 7—Outline drawing of Annapolis experimental gas turbine unit shows arrangement and relative size of various elements of test design. Note comparable size of operator



ENGINEERING NEWS *at a glance*

High-alloy cast iron rolls which have wear-resisting working faces with a scleroscope hardness of 85 to 90, and resistance surface indentation or marking equal to that of 90 to 100 scleroscope steel, is the latest development of Mackintosh-Hemphill Co., Pittsburgh. The Nironite D rolls, the company states, enable them to attain and retain unusually high polish which imparts an unmarked, mirror-like surface to the mill product. Spalling, should it occur, is very shallow and easily removed by grinding, and it is not necessary to return the rolls to the producer to have the surface hardened again, the company states . . . . . .

Bearing shells of Meehanite castings cleaned with a recently developed Kolene process are reported to make excellent backings for babbitted engine bearings, according to Meehanite Research Institute, New Rochelle, N. Y. Strength properties and metal structures of the castings allow production of precision shells, and the cleaning process provides a chemically clean surface, removing free graphite particles from the metal face, permitting a perfect bond between the Meehanite bearing shell and babbitt metal, the institute reports . . . . . .

The same manufacturing process used by Molded Materials Division of Pharis Tire & Rubber Co. in producing brake linings for military trucks and aircraft, is now being used to make linings for all makes of passenger cars, "Duraz Plastics News" disclosed. Some changes in the formulation of the molding material were necessary to give the new linings the correct combination of physical properties, it stated. The properties differ to meet variations in operating speed and pressure . . . . . .

Blaw-Knox Co. is now holding the manufacturing rights of the Zanderoll process, which is said to be a radical departure in the method of applying insulating varnish to armatures, stators and similar types of electrical equipment. Process, originally developed by Sterling Varnish Co., Haysville, Pa., eliminates numerous steps and much of the manual handling in applying varnish, it is reported. . . .

Two young engineers, Crawford Robertson and Hobart Holly of Federal Shipbuilding & Dry Dock Co., recently caused the company to lay plans to advance into further developments of air conditioning and ventilation as a result of a development they "cooked up" which provides spring-like interior weather for ship passengers regardless of outside weather changes. According to Kearny, N. J. ship makers, temperature regulators installed in each cabin control the desired "climate" which enters the cabin by means of a ceiling diffuser. At present, the development is being installed on a cargo-passenger ship being built for the American-South African Line, it is said . . . . . .

Hard, smooth, antifriction protective linings for tapped threads in light metals and plastics are provided by Heli-Coil screw thread inserts being produced by Aircraft Screw Products Co. Inc., Long Island City, N. Y. The inserts are said to eliminate seizing, greatly reducing tendency of stripping, and they occupy about half the cross-sectional area of solid bushings. Where a substantial increase in strength of the threaded assembly is required, the company is making an insert which performs the same function as the Heli-Coil, but is used in connection with screws and studs of the maker's Aero-Thread system. Latter employs a thread form consisting of a truncated vee in the tapped hole, and a circular section thread in the screw or stud, according to the company . . . . . .

From Troy, O., comes word of lead sheets being joined together by the carbon arc method. In preparing a room at Hobart Trade School for installing a 250,000 volt x-ray machine, it was necessary the floor and walls be lined with sheets of ⅛-in. lead to absorb rays of the x-ray unit. Lead sheets were lapped on the walls, but in laying a smooth floor, Hobart Bros. reports, edges of the sheeting were butted and joined by arc welding, using a carbon arc torch. A Thinweld attachment was used to cut the amperage of a 300-ampere welder to 15 amperes, and strips of lead from the ⅛-in. sheets were used for filler rod. Joints were welded at the rate of 24 to 30 in. per minute by puddling the filler with a slight weaving motion, the company states . . . . . .

Fairchild's huge twin-engined Packet, boasting facilities for loading, unloading and sorting mail will revolutionize air mail service just as the railroad car accelerated surface delivery, officials of Fairchild Engine & Airplane Corp., New York, believe. It is said the giant plane will handle mail loads up to 6 tons on a 500-mile trip. Its huge clamshell-like rear doors open the full width of the boxcar-like fuselage to admit heavy cargo directly from trucks . . . . . .

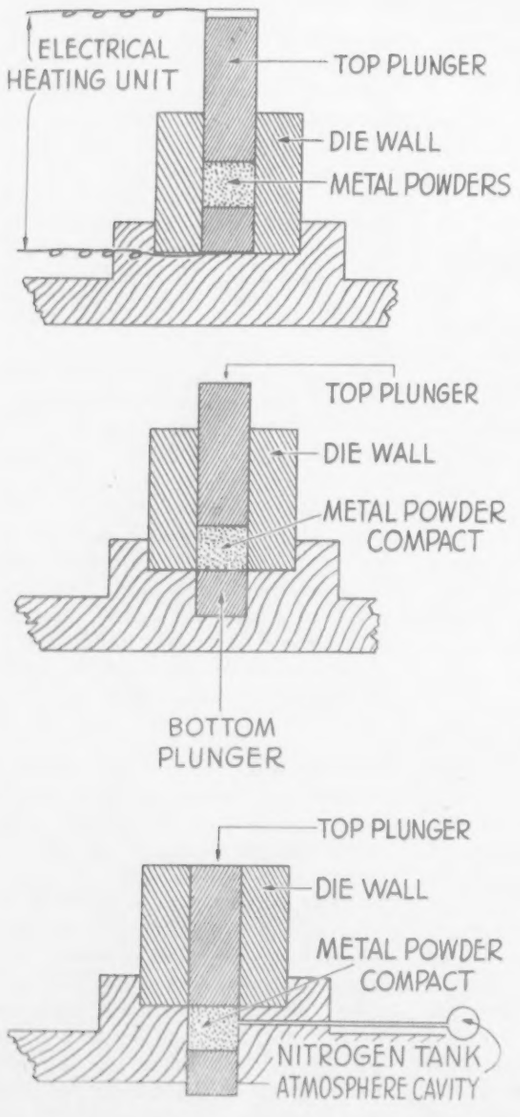
Improved reproduction of blueprinting and related processes is now possible due to development of a new treatment by H. P. Andrews Paper Co., New York, with the assistance of Monsanto Chemical Co.'s Merrimac Division. The treatment provides greater sharpness of lines and more fidelity in details, especially on reproductions of tracings made wholly or in part with pencil. Development is based on Syton, a modified silica product originally developed for treating textiles, Monsanto reports . . . . . .

A foam killer reported to be effective in eliminating foaming problems as difficult to control as those which occur during steam distillation, or vacuum concentration of various aqueous alkaline solutions and emulsions is the latest development of Dow Corning Corp., Midland, Mich. The silicone product is a viscous compound, chemically inert, nonvolatile with a slight but not unpleasant odor. Called DC Antifoam A, it is dispersable in such solvents as benzene, carbon tetrachloride, toluene and VM and P naphtha, the company states . . .

By HARRY L. STRAUSS, JR.
Technical Director
National Diamond Hone & Wheel Co.
New York

TiH increases compact density

. . . and improves other physical properties of metal powders by reducing oxides during sintering. Need for externally generated reducing atmosphere eliminated



TODAY, more than ever before, the manufacturer requires processes and methods which are easily applied and which produce a superior product. In search of such a method which could be used in powder metallurgy to impart greater density to pieces of contour and bas-relief shapes, the author has evolved a technique for use of titanium hydride (TiH) in what he calls semi-hot press method.

It is fairly well known that in the use of metal powders, maximum density and other desirable physical properties are achieved only when best contact of the particles is obtained. Apparently, the main stumbling block in the realization of this optimum condition is the presence of oxides. Consequently the reduction of these oxides, especially those found within the interior of the green compact, became the main objective of the investigation.

If a green compact is sintered in a reducing atmosphere such as hydrogen or carbon monoxide, most of the oxides can be removed. However, those that remain, and specifically those of an occluded nature, can cause considerable difficulty. These internal oxides are never reduced by the controlled atmosphere due to the fact that the density of the compact has been increased by the processing. But, if a reducing agent could be combined with the powder, much of this trouble could be overcome.

For example, if there were a source of hydrogen within the interior of the compact for the generation of this gas while the density of the compact was still low, sufficient paths of egress would be provided for the ensuing gases. The result would be a substantial reduction of the occluded and internal oxides. This technique is, essentially, the basis of the author's semi-hot press method. Another important feature of this method is that some surface oxides are removed by the attrition of one particle against the other during the hot press. Also, it should be noted that during semi-hot press no outside reducing atmosphere is needed.

Hot press of powder metal parts, in the author's opinion, is most desirable but the least practical method of manufacture for any but carbide materials. Strength wear re-

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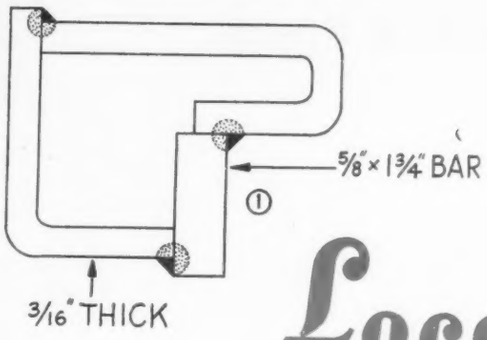

Automatic arc welding setup for Racine plant which mass produces part for cooling engine jacket and oil is model of efficiency

Locomotive radiator headers

By F. C. ARCHER
District Manager
Lincoln Electric Co.
Milwaukee

AN interesting installation of automatic metallic arc welding is that in operation at Young Radiator Co., Racine, Wisc. The company uses the process to mass-produce tanks which serve as headers for locomotive radiators and turns out a product which is not only more serviceable due to its greater strength and rigidity, but is also improved in appearance.

The former conventional method of construction was discarded due to poor quality of the material and excessive delays in delivery from an outside source of supply.

The tanks or "headers" are used for bolting large sections together which make up the complete locomotive radiator. Assembled radiators, which are tack and finish welded manually, are used for cooling the engine jacket and oil on large locomotives produced by one of the nation's largest manufacturers. The welded structures must withstand considerable abuse due to the constant shocks and jolts of a locomotive as it moves along at high speeds.

In this case the Lincolnweld process was applied to the job to produce a continuous, uniform weld without the danger of leaks and with less possibility of warpage due to the concentration of heat over a smaller area at a time.

The arrangement of the automatic welding installation as seen in Fig. 2 is in keeping with modern production practice. Travel carriage on which the welding head is mounted, travels on a beam which can be raised and lowered to accommodate the work. The members comprising the tank are first clamped in welding fixtures that are mounted on movable tables. Tables are on wheels moving in tracks on horizontal plane. Tanks are then put on table by means of a small hoist. Two tables are provided so while one is being loaded the other can be unloaded and slag removed.

The tanks are clamped in the fixture by means of adjustable forks. The clamps are made so that the work can be rotated by means of a ratchet on the end. The whole jig can be moved at right angles to the work by a rack and pinion arrangement. The channel on which the welding head is mounted is supported on two upright columns and can be moved up and down by controls mounted on the hopper of the machine. Brass bars are clamped on the tanks to prevent the flux from falling away from the work and also to prevent it from getting inside the tank. A close-up of

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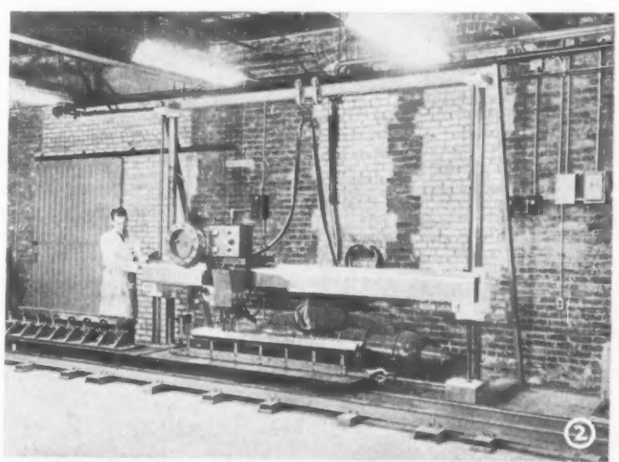


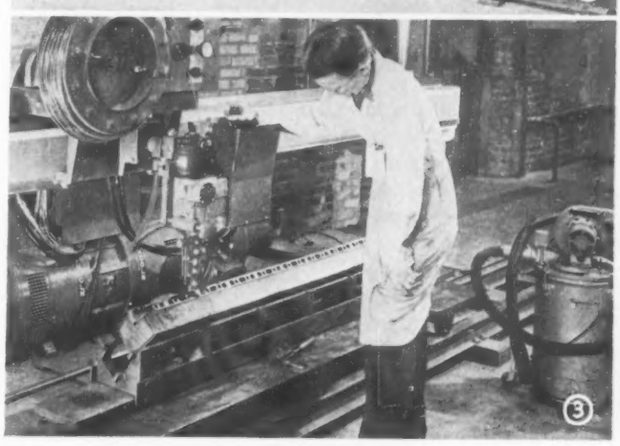


Fig. 1—Cross-sectional drawing of tank showing location of automatic welds

Fig. 2—Overall view of compact installation for automatically welding headers

Fig. 3—Automatic welding head is placed in position for fillet welding operation. Vacuum suction unit at right is used to recover surplus flux

Open-Hearth and Blast Furnace Groups

Report on

Operating Procedure

NATIONAL meetings of the Open Hearth Committee of the American Institute of Mining and Metallurgical Engineers were resumed last month after having been interrupted for the first time in 21 years because of wartime restrictions. The conference held at the Palmer House, Chicago, April 24-26, was attended by 971, the Open Hearth group registering 795, and the Blast Furnace and Raw Materials group 176.

The 1947 National Conference will be held at the Netherlands-Plaza Hotel, Cincinnati, with a plant visitation at the Middletown, Ohio, plant of the American Rolling Mill Co., scheduled for April 21, and technical sessions for April 22-23. The 1948 conference will be held in Pittsburgh.

Various subjects presented and discussed at the various technical sessions of the basic open-hearth group follow:

Checkers. L. A. Lambing, superintendent of open hearth and bessemer departments, Jones & Laughlin Steel Corp., Pittsburgh, in comparing furnaces having one checker and two checkers at each end with production and fuel and refractory consumption alluded to five 175-ton and four 225-ton tilters—all fired with residual tar. Because tar and residual tar shortens the life of the checkers, the air passages had to be increased in size to such an extent that there was not enough heating surface left to furnish the necessary preheat for efficient furnace operation, which decreased 41.4 per cent. Furnace was equipped with Blaw-Knox valves before the checker change.

Next, the checker chambers on another 175-ton furnace were lengthened, the division walls removed, and flat checker roofs and Blaw-Knox valves installed. The tons per hour, he stated, increased 9.9 per cent on duplex steel and 8.1 per cent on scrap and hot metal steel. While rebuilding costs for labor and materials have increased $45,000 per year on each adjacent furnace, the rebuilding costs on this furnace have decreased $1000 per year making a total saving on rebuilding costs of $46,000 annually.

Limestone. Tendencies toward the use of smaller sizes of limestone are bound to continue. Stone of ⅝-in. size is preferred for 125-ton furnaces.

It was also brought out that small sizes of limestone dissolve more quickly, sizes under 2 in. do not blow up, the smaller sizes can be used economically from bins, and furnace men object to the use of small sizes. Operators prefer stone under 1 per cent silicon and under 0.04 per cent sulphur.

Substitutes for Pig Iron. Use of a high per cent of coke in the charge and with the tap to tap time pegged around 13½ hours gave a production rate of 12.37 net tons per hour of ingots, according to one operator. The furnaces produced on low-carbon steel at the rate of 12.37 net tons of ingots. The carbon in the form of coke had to be about double to be equivalent to pig iron. Use of foundry coke presents some difficulty by the introduction of sulphur in the bath though this condition is not extremely serious. Use of coke seems to show better yield than heats made with pig iron. Charging time is slowed up when large quantities of coke are charged.

In appreciation for the untiring efforts of L. F. Reinartz, Works Manager, American Rolling Mill Co., Middletown, O., who for the past 19 years has served the Open Hearth Committee of the American Institute of Mining & Metallurgical Engineers as general chairman, the executive board at the Annual Fellowship Dinner, Thursday evening, presented him with a lifetime registration, a past president certificate (the first to be awarded) and a deluxe volume of Open Hearth Proceedings for the past 20 years. The presentation was made by A. P. Miller, general chairman, National Open Hearth Committee and general superintendent, Inland Steel Co., Indiana Harbor, Ind.

Labor Saving Devices. At an eastern plant, brick going into storage and then into furnace repair work are handled on pallets by forked lift trucks. Removing debris from slag pockets to cars is accomplished by mucker machines which dump into the base of the conveyor serving the hopper cars. Application of this means of brick removal has saved 20,000 to 25,000 manhours per year. Removing flue dust by the vacuum system is effecting savings of $30,000 to $40,000 per year as well as a reduction from 40,000 to 22,000 manhours per year.

Cleaning Checkers and Flues. At one plant where two types of flue design are employed with checkers 6¾ x 6⅜ in. and 6 x 10½ in., respectively, the air and gases are free to travel angularly through the checkers in the direction of gas flow. Checkers are blown out with steam every 7 days. The steam lance is built with 1-in. pipe and operates at a steam pressure of 108 psi. Use of the steam lance has reduced the removal of flue dust by about 50 per cent.

An air turbine equipped with chains is employed to clean out the checkers. The turbine shaft is threaded to take several different sizes and shapes of plates with chain attachments. Two men alternate every 15 minutes on each turbine, one such crew being supplied at each end of the furnace. During a rebuild, cooling off the checkers has been a factor. Knocking in a hole in the neck arches at each end of the furnace as soon as the furnace is shut down has been found effective. Reversing valves then are centered and the boiler fan operated at full speed. The checker bulkheads are left closed so that the fan pulls cold air from the neck arches across and through the checkers. Effective checker cleaning by this procedure can be started in 16 to 24 hours after the last heat of steel has been tapped.

Rammed Bottoms. B. D. McCarthy, open-hearth superintendent, Republic Steel Corp., Youngstown, O., pointed out that there are two modes of wear on a bottom, first, physical wear due to mechanical abrasion of solid part of the charge; second, a chemical attack by the furnace slag or by low-melting constituents in the bottom itself which causes gradual softening and wearing away of the bottom.

To resist the first type of wear, the

speaker stated that the bottom should be dense and rigid at operating temperatures. To resist chemical attack, the bottom should contain a possible maximum amount of solid, refractory material which is not fluxed by the slag or other liquids and should contain a minimum amount of liquid materials at operating temperatures.

This means that the ideal bottom should consist of dead burned grain magnesite with only just enough bonding material to insure holding it in place. Since the bottom must contain the same liquid material at operating temperatures, he stated, this liquid should be viscous, inasmuch as a fluid free running liquid would tend to increase the reaction rates and bottom wear.

We have had our rammed bottoms down for as long as 6 weeks with no visual evidence of any hydrating action and no apparent trouble from this cause after the bottoms were put back in operation.

No matter what type of material is used, Mr. McCarthy pointed out, most bottom troubles come from failure to maintain the banks and flats properly. He believes the original working surface of a bottom, say from 3 to 6 in. will have disappeared in many places after 90 days of operation. The thickness of a bottom regardless of the type of construction is a worthwhile insurance against breakouts, he stated in conclusion.

Slag Thimbles and Cars. Expansion bands installed around corrugated thimbles will prevent warpage to a great extent. By installing three thimble car, any tendency for the car to upset in dumping is prevented by the weight of the other two thimbles. At one particular shop, the slag containers are square boxes and these usually are set aside for at least 4 hours for cooling before being placed in service again; corner cracks which frequently develop are repaired by welding. One operator to prevent skulls sticking in the ladle sprays the interior with bone ash, every time the thimble comes from the dump.

Molds. Thin walled molds used at one particular shop were said to effect a saving of 25 per cent, longer mold life and better quality steel. When making killed steel the best results are obtained by employing fluted molds. Average mold life is obtained by allowing the molds to rest from 8 to 10 hours after they have been stripped from their ingots. When the rest period involves only from 4 to 5 hours mold life is affected. At one shop fluted molds last for 70 heats whereas the plain mold has a life of about 100 heats.

Mold Coatings. Tar is widely used for this purpose according to comments from operators. One shop which has used tar for coating the molds for at least 12 years employs an electric sprayer. A shop in the Great Lakes district for the past 2 years has used powdered pitch which is applied by compressed air. A few shops employ graphite which is sprayed on the surface of the mold, one application being sufficient.

Basic Refractories. Increased life was reported on the second all basic furnace, this being attributed to the small expansion allowance. The cost of the basic lining has come close to the cost of a silica brick lining cost. The basic furnace has maintained an advantage of 1 hour per heat over the silica brick furnace and has reduced lime consumption about $0.06 per ton.

Basic Rammed Doors. Two important factors are involved in doors of this type, namely, the mechanical setting to hold the plastic, and the rammed material. After the plastic material is in place drying it with steam for a period of 48 hours gives the longest door life. Several doors are laid on the ground with the plastic lining in the uppermost position and are connected in series to a common steam line to dry. Average door life under this type of drying is approximately 100 heats. Studs ¾-in. diameter are bound to work much better than ½-in. studs. Cost of the studs is about 20 per cent of the cost of relining the door.

Nozzles. Low fusion type nozzles afford a smooth pouring operation according to one operator. The tar nozzle has been found much stronger than the ordinary type. At an Ohio plant, trouble with dripping nozzles was remedied by soaking the nozzle in tar. This was accomplished by filling a box with tar to a depth of 17 in. and hanging the nozzles therein for a period of 48 hours to soak. After a period of drying for 24 to 48 hours the nozzle was placed in operation.

Blast Furnace and Raw Materials Conference . . . .

ACTIVITIES of the Blast Furnace and Raw Materials Committee got under way at a luncheon and business meeting attended by about 85. W. E. Brewster, general superintendent, Wisconsin Steel Division, International Harvester Co., Chicago, introduced A. J. Boynton, consulting engineer, Chicago, as his successor as chairman of the committee. Mr. Brewster relinquished the post because of his recent election to the chairmanship of the institute's Iron and Steel Division. T. B. Counselman, manager, contract engineering division, Dorr Co., New York, continues as vice chairman. T. F. Plimpton, superintendent of blast furnaces, Inland Steel Co., Chicago, has assumed the committee's secretaryship, succeeding Owen R. Rice, metallurgical engineer, Freyn Engineering Co., Chicago, resigned.

New developments in coal washing practice were covered in a paper presented by W. L. McMorris, engineer in charge, preparation and research, H. C. Frick Coal Co., Pittsburgh. Specifically, the speaker described the heavy media process utilized at the Robena mine, where facilities provide adequately for sampling, mixing and weighing, so that shipments are of uniform composition and quality. Commenting upon the growing need for such facilities, one discussor explained that mechanical mining is responsible for the increase in inert material in present-day coal. For this reason, blending and washing is important to effect reduction of ash and sulphur.

Research of Inland Steel Co., Chicago, for selection of suitable low-volatile coking coal to be used in the manufacture of metallurgical coke was outlined by E. J. Gardner, superintendent of the company's blast furnace and coke department. Company has depended upon No. 3 Pocahontas for its coking operations, but approaching depletion of this high-grade coal makes the finding of suitable substitutes or blends of grades timely. Among coals investigated and tested were Beckley, Glen Rogers, Illinois, Eagle, Wheelright, Eccles, and others.

Expansion of coal during carbonization is a characteristic of paramount importance, consequently the tests centered heavily around this point. Mr. Gardner pointed out that excessive expansion may damage oven walls, and in practice this damage is not easily observed. Coal from the same vein varies widely in expansion properties—that under the greatest pressure in geological formation apparently having the greatest expansion during carbonization. In its research, Inland conducted tests in a movable wall oven, and when potentially desirable coals were found, ran three-day tests in one of its coke batteries employing a 17 3/4-hour coking period.

The speaker pointed out that coke is rated according to its performance in the

(*Please turn to Page* 152)

There is an increasing demand for electroplated finishes on aluminum alloys. Two general and one special procedure for preparing aluminum for electroplating are described

Electroplating on ①

ELECTROPLATING on aluminum generally is done for two primary reasons, for decorative effects and for protection against corrosion. There are also other reasons, some of which are becoming very important: To promote wear resistance, to facilitate soldering, or for electrical contacts. Due to the lightness, availability, and low cost of aluminum, there is an increasing demand for electroplated finishes on aluminum and its alloys, as this metal finds increasing applications in a wide variety of new products.

Aluminum alloys may be electrolytically protected by zinc or cadmium deposits under some service conditions. Aluminum alloys can be soldered by using special fluxes and solders, but changes in technique and plant practice make it desirable in some cases to electroplate with copper, tin, or other metal to facilitate soldering. Aluminum is sometimes plated where it is a part of an assembly containing other metals such as steel or copper, and in such cases the assembly is normally cadmium, zinc, or nickel plated.

If bonding of rubber to aluminum is required, the aluminum is brass plated with the conventional brass solutions used for this purpose. Coloring of aluminum is sometimes done by first copper or brass plating and then oxidizing these plates. Heavy coatings of chromium plate were applied to aluminum during the war to resist chemical attack as well as wear, particularly for airplane engine cylinders. In such cases the chromium is usually applied upon thin copper or copper-nickel coatings.

By far the greatest use for electroplated aluminum is for decorative purposes where nickel and chromium, gold, silver, and other metals are applied to aluminum articles to be carried, such as cigarette lighters, dress ornaments, and bracelets, which are made of aluminum because of its lightness.

To electroplate aluminum, it is necessary to prepare the surface in such a manner that the deposited metal is adherent. Compared to other common metals, aluminum is more active chemically, and the methods used to secure good adhesion must necessarily differ somewhat. Studies have been made of methods for electroplating aluminum for the past 30 years with many patents being issued over this period. However, generally satisfactory plating of aluminum has occurred only recently, largely due to the development of two methods which were described before the Fall 1945 Electrodeposition Symposium[1] of the Electrochemical Society in New York by Helmer Bengston of the Aluminum Co. of America.

One method uses as a bonding layer an immersion coating of zinc; the other utilizes a bonding layer of aluminum oxide. In a paper before the Annual Educational session of the Detroit Branch of the American Electroplaters' Society, Dr. Walter R. Meyer described a modified zincate dip[2] for electroplating on aluminum. According to Dr. Meyer the success of the "zinc immersion predip" is apparently due to the use of very concentrated sodium zincate solutions containing a considerable excess of sodium hydrozide to repress zinc-ion formation. This method has given adhesive forces between the plated coating and the aluminum as good or better than the rupture strength of the aluminum base metal.

Buffing of Aluminum: If high gloss coatings are desired on aluminum, it should be buffed to a high luster. It is not necessary to go to the extreme high luster such as is obtained with the use of lime compounds. Aluminum is very susceptible to smoothening by means of wire brushing, abrasive buffing, or scratch brushing. Frequently, a fine wire brushing can be done on aluminum parts, and if heavy copper or nickel coatings are applied, they can be buffed to a high luster. The use of fine wire brushing obviates the difficulty attendant to removal of some grease buffing compositions.

Thin gage aluminum is easily collapsed during the buffing and brushing operations, and the use

Aluminum

of special forms to hold the aluminum during buffing to prevent collapse is often necessary. The aluminum surface need not be roughened mechanically to secure high adhesion of the plated coatings as was formerly thought, in fact tests indicate that severely roughened surfaces tend to give poorer adhesion than smoother surfaces.

Pre-cleaning: It is just as necessary to properly clean aluminum as it is other metals for electroplating, and many causes for failure of plated coatings have been due to improper cleaning. Work that has been buffed with grease compositions should be pre-cleaned by means of emulsion cleaners or vapor-solvent degreasers. Emulsion cleaners containing naphthas or straight chain hydrocarbons are sometimes incapable of penetrating grease films, and emulsion cleaners containing chlorinated compounds such as ethylene dichloride are more effective[2].

After soaking in the emulsion cleaner, the work should be rinsed thoroughly with two running cold water rinses or by means of a pressure spray rinse. The latter type rinse is preferred. If emulsion pre-cleaning or vapor-solvent degreasing is not done, the work must be immersed in the alkali cleaner too long to remove the packed-in solid dirt, and a very rough base will then result, making it extremely difficult to secure a highly buffed plate.

Alkaline Cleaning: All alkaline cleaners are not suitable for cleaning aluminum previous to plating. Cleaners containing silicates tend to leave an adsorbed film upon the surface that definitely interferes with proper plating. Alkalis such as sodium hydroxide, trisodium phosphate, tetrasodium pyrophosphate and sodium carbonate in various combinations are satisfactory. Good cleaners especially compounded for preparing aluminum for electroplating contain surface active materials that increase detergency and create foam to reduce hydrogen-caustic spray. These materials, however, must be selected so that they do not precipitate as calcium,

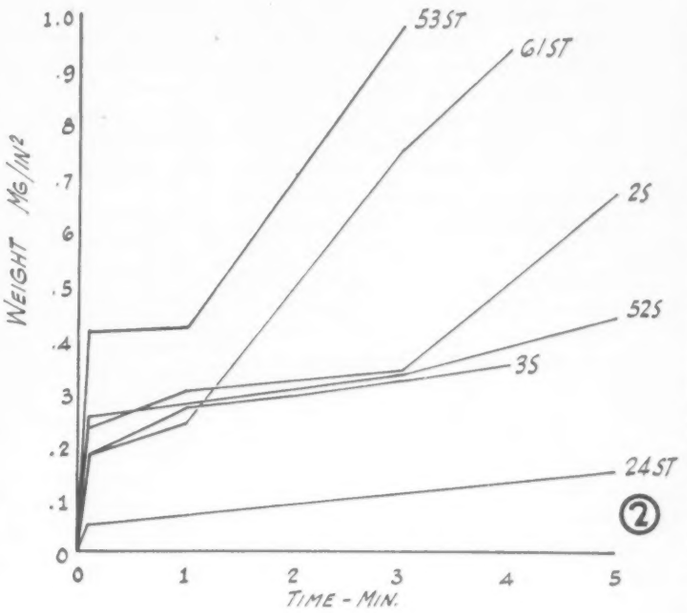
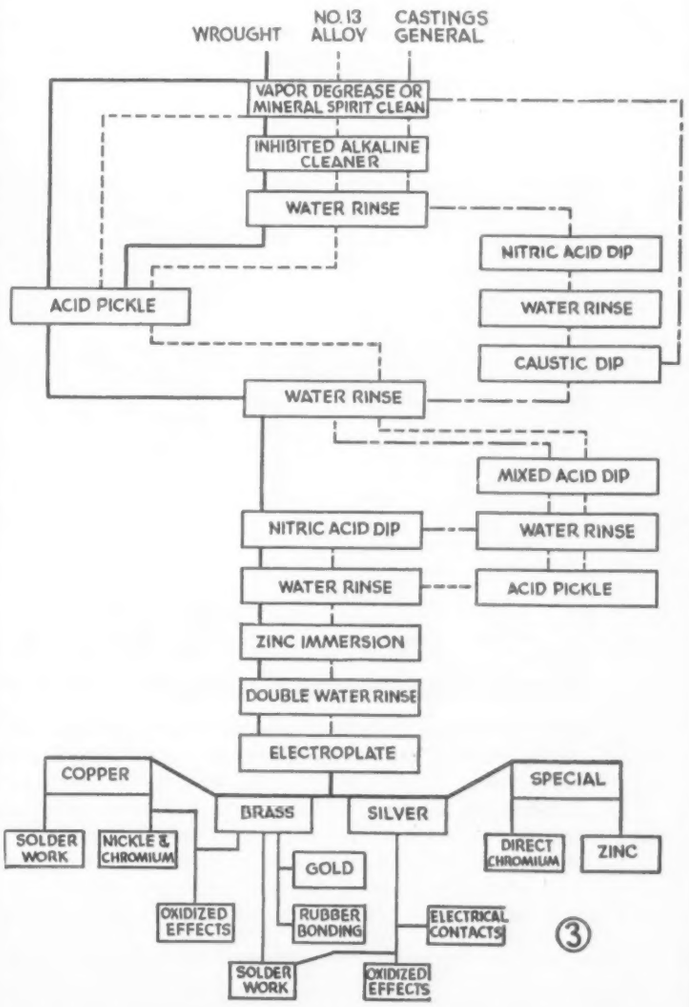


Fig. 1—Aluminum buckle nickel plated by the Alumon zinc immersion process. Adhesion at sharp bend is satisfactory

Fig. 2—Effect of alloy composition upon weight of zinc deposit produced in the zinc immersion pretreatment

Fig. 3—Zinc immersion process flow sheet for electroplating on aluminum



magnesium or aluminum salts and must not be easily salted out.

The normal cleaning time in properly compounded cleaners is from 10 sec to 1 min. The shorter time can be used when pre-cleaning is done. The operating temperature range is from 170 to 190°F. At higher temperatures, there is too violent reaction between the cleaner and the aluminum. After cleaning, work is thoroughly rinsed in running cold water or by pressure spray rinse.

Racking: At first thought, racking appears to be easy for aluminum objects. However, due to the lightness of most objects to be plated, there is not sufficient pressure of the work against the hook to enable a secure contact at the point of racking or where the hook contacts the bus bar when loose racking is done, and as a result, thin or imperfect plating may occur. ***It is important that tight racking of aluminum be done to secure good results.*** Spring contacts should be used for racking the piece and the aluminum rack itself should be clamped to or fit snugly against the bus rod. The racks should be made out of springy aluminum wire such as 17S.

Stripping of almost all plated coatings from aluminum wire can be done in a 50 per cent by volume solution of nitric acid without harming the aluminum racks. Racks are frequently made of bronze, brass, or copper. However, there is danger of an electro-chemical action taking place during immersion in the zincate solution which will prevent proper formation of a zinc film, particularly adjacent to the point of racking. If the rack contacts the piece inside, where the plating will not show, racks made of metals other than aluminum may be satisfactory. However, even in such cases, the body of the rack should be covered with a stop-off paint.

Zinc Immersion Plating

Pretreatment: Hewitson[3] has described a procedure for plating aluminum based on the formation of a zinc immersion coating. Years passed before this procedure assumed commercial importance, but today it is creating widespread interest among electroplaters. Aluminum Co. laboratories have made contributions to this procedure which have helped to insure successful applications of electrodeposits. These contributions appear to lie chiefly in the methods of preparing the aluminum surface prior to the application of the zinc immersion layer[1].

A typical procedure for plating on wrought aluminum alloys consists of the steps shown below. A more complete outline of the procedure is shown in Fig. 3, which is a flow sheet showing in a general way the procedures both for wrought alloys and for casting alloys.

Step 1—Clean—The removal of oil or grease films is necessary to permit uniform attack in the subsequent acid etching operations.

Step 2—Chromium pickle—Time ½ to 2 min.; solution: 175 g./L. conc. sulphuric acid (H_2SO_4) 35 g./L chromic acid (CrO_3); temperature: 150°F. (65.6°C.)

Step 3—Rinse.

Step 4—Concentrated nitric acid dip—time ½ to 2 min.

Step 5—Rinse.

Step 6—Zinc immersion treatment—time ½ to 2 min.; solution: 400 to 500 g./L. caustic soda (NaOH) 75 to 100 g./L. zinc oxide (ZnO); temperature: 80°F. (26.7°C.)

Step 7—Rinse.

Step 8—Electroplate.

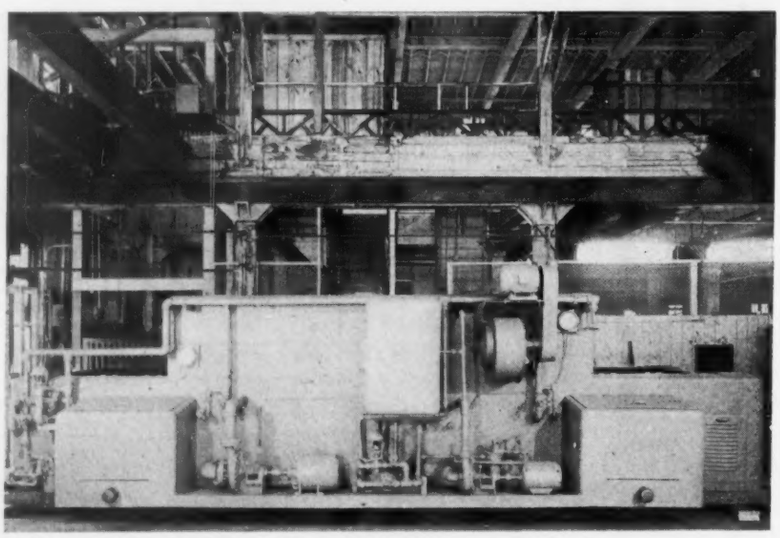
The treatment of aluminum casting alloys differs in that a mixed acid etch is used in place of the chromium pickle. The mixed acid etching solution consists of a mixture of 3 parts of concentrated nitric acid and 1 part of concenterated hydrofluoric acid, used at room temperature.

Mechanism of Zincate Treatment: The mechanism of the reaction in the zincate solution involves first the removal of the superficial oxide film which develops after the acid etching treatment. As soon as the bare metal surface is exposed, some aluminum goes into solution, but the aluminum dissolved is replaced by an equivalent weight of zinc. These successive reactions make possible an intimate union of the aluminum and the zinc layer.

The deposit produced in the zinc immersion solution is believed to be largely metallic zinc. If the operating conditions are correct, deposited zinc is smooth and lustrous. It varies considerably in appearance, depending somewhat upon the aluminum alloy upon which it is applied. On copper-bearing aluminum alloys it is scarcely detectable. On many alloys a slate gray film is produced.

The effect of alloy composition upon the weight of zinc deposit produced is shown in Fig. 2, prepared by the Aluminum Co. Laboratories. It is observed that the zinc film grows rapidly during the first few seconds of immersion, but thereafter it increases in thickness at a much slower but uniform rate. The difference in weight of the zinc deposits produced on the various alloys does not seem to have any influence upon the quality of adhesion of the subsequently applied electroplates. The time of immersion is not critical, but is generally within the range of 1 to 2 min. For copper-bearing alloys the zinc oxide of the zinc immersion solution is preferably replaced with an equivalent amount of zinc sulphate. For 61ST alloy it is recommended that 5 ml/L of 48 per cent hydraulic acid be added to the chromium-pickle solution.

The zinc immersion pretreatment is



WELD SCALE CLEANER: To remove loose scale formed when two halves of an automotive axle housing are seam-welded together, housing is subjected to cleaning action of this special machine developed by Howard Engineering & Mfg. Co., Cincinnati. At first station, housing on conveyor belt is entered by revolving steel brush, while cleaning solution is fed around brush and over exterior of housing, flushing away scale. At second station, housing is dried with hot air. Conveyor belt is equipped with fixtures that hold housing in proper position during both operations

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applicable to barrel plating as well as to still plating. It should thus adapt itself to full automatic plating requirements. The surface preparation treatment involves only a period of 3 to 5 min and is, therefore not unlike the preparation treatments used for plating upon other base metals.

Plating on Zinc Immersion Film: After the zinc immersion coating has been applied, the aluminum is ready for electroplating. Various electrodeposits can be applied over the zinc layer, such as silver, copper, brass, cadmium. Nickel has been deposited from special solutions developed for plating over zinc[4]. The ideal pH range for plating upon the film is reported to be from 6 to 10, and solutions that are highly alkaline such as the cyanide zinc solution or sodium stannate tin solution cannot be used.

Silver plating can be done satisfactorily directly upon the zinc film. The work is first given a strike in the usual silver strike solution containing approximately 0.3 oz/gal of silver cyanide and 12 oz/gal of potassium cyanide; operating temperature 70-80°F; current density from 10 to 40 amps/sq ft; time, 30 sec to 2 min. Following this, the work is plated in the usual silver plating solution.

Copper plating solutions recommended for use on the zincate film should have a free cyanide content below 0.4 oz/gal and a pH not higher than 10.5, with an optimum temperature range of 80-90°F. After an initial plate in this solution the work may, if desired, be transferred to a regular type cyanide copper plating bath. The copper pyrophosphate[5] type bath has also been found satisfactory for plating over the zinc film.

Nickel plating is possible directly upon the zinc film using the ammoniacial type nickel plating solution[4]. Nickel from standard nickel plating baths is usually deposited upon a copper plate applied from either the cyanide type copper solution or the pyrophosphate type solution.

Brass plating can be carried out successfully on aluminum using the zinc immersion pretreatment without a copper undercoat. The pH of the brass solution should be kept below 10.5.

Cadmium plating can be carried out successfully, however, in most cases a "strike" cadmium solution is used containing approximately 2 oz/gal cadmium and 8 oz/gal of total sodium cyanide. After the work has been plated in this solution for about 1 min, it can then be transferred to a standard cadmium solution.

Procedures are also available for electroplating upon aluminum which involve electrochemical oxidation and plating upon the oxide or partially reduced oxide film. The thin oxide coating which protects aluminum alloys against corrosion has in the past been considered one of the obstacles in plating upon aluminum. It has been found that if this naturally formed thin oxide coating is replaced with a suitable electrolytically formed oxide coating, it will serve as a base for electroplating and will form the bond between the aluminum base metal and the electroplate.

Travers[6] has described a procedure by which aluminum alloys are anodically coated with either dc or ac in any one of a number of electrolytes. The coating formed is then partially removed by chemical treatment to render it receptive to an electroplate. Fischer[7] has described the use of a phosphoric acid electrolyte in preparing aluminum for electroplating. The Aluminum Co., in exploring the possibilities of anodic treatment in phosphoric acid as a means for preparing aluminum for electroplating has found[1] that by proper selection of the anodic coating conditions, an oxide coating can be applied to the surface which is suitable for applying an electroplate.

PREPARATION OF ALUMINUM FOR CYANIDE ZINC PLATING

1. Clean.
2. Acid dip.
   (a) Chromium pickle, 5 min or
   (b) Mixed acid dip, 15 to 30 sec
3. Rinse.
4. Plate in standard cyanide zinc solution, 5 min at 0.32 to 0.54 amp/dm². Continue at normal current density about 1.64 amp/dm². (see STEEL, Oct. 22 1945, for complete bath formula).
5. Rinse and dry.

Conditions for Use: In the phosphoric acid procedure the anodic treatment conditions are so selected that the oxide coating formed is in a proper condition for electrodeposition. The control ranges for the anodizing treatment were found to be much narrower in preparing aluminum for nickel plating than for copper plating. The plating solutions found to be particularly suited for plating over the oxide film were Unichrome copper[8] and H-VW-M semi-bright cobalt-nickel[9]. The former solution was operated at pH 7.5 and the latter at pH 3.7. The cyanide type plating baths have also been used, but the results obtained depend in part upon the rate at which the base metal becomes covered with the electroplate. In recesses there is the danger that the strong alkaline solutions may attack the oxide coating before it is completely covered with metal, and thereby impair the quality of the electroplate bond. In plating over the oxide coatings, deposition takes place initially within the structure of the oxide coating. During the first few moments of plating the oxide coating turns dark in color, but thereafter the surface acquires the characteristic appearance of the deposited metal.

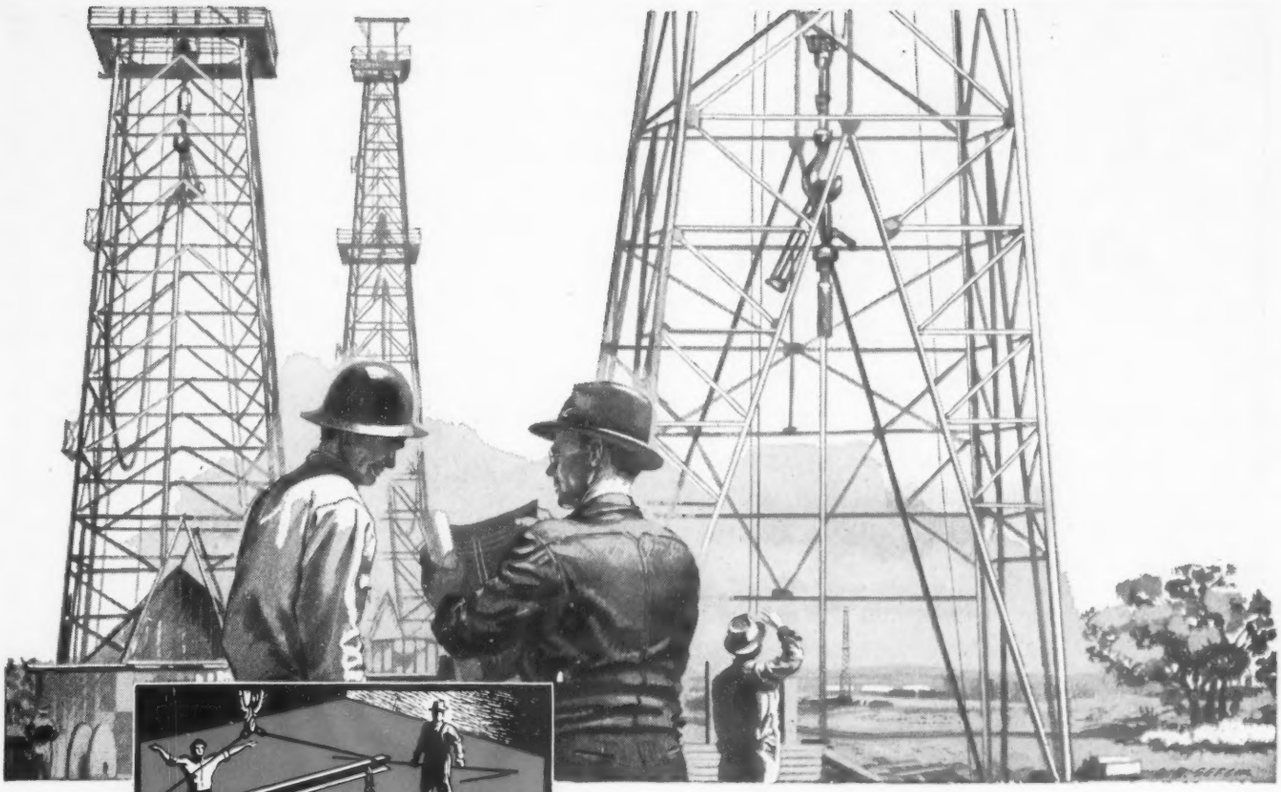
The phosphoric acid electrolyte operating conditions vary, depending upon the composition of the various aluminum alloys. As an example of the procedure used, 3S aluminum is prepared for Unichrome copper plating by anodically coating under the following conditions: Electrolyte, 354 g/L H_2PO_4; temperature, 32°C (90°F); current density, 1.3 amp/dm² (12 amp/sq ft); time, 10 min. After rinsing, the work is immediately transferred to the plating solution. In this particular case the same set of anodic coating conditions are also suitable for preparing the surface for nickel plating process.

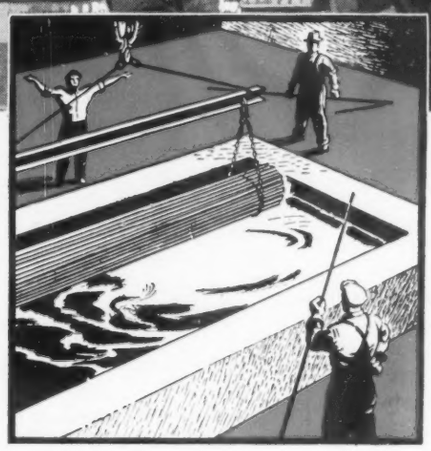
Electroplates, when properly applied over the oxide coating, are smooth and have excellent adhesion. Tests have shown, as in the case of electrodeposits over the zinc immersion coatings, that the bond strength is greater than the cohesive strength of the base metal. The anodic treatment procedure is not applicable for electroplated surfaces requiring good electrical conductivity due to the resistance through the oxide coating. For good electrical conductivity the zinc immersion procedure is preferred to the anodic coating procedure.

Special Procedure for Zinc-Plating

It is possible to zinc-plate aluminum by a method which is as simple as any of the commercial plating procedures used for other base metals. Zinc electroplates upon aluminum have two properties that may be of value commercially. They have been applied to a limited extent commercially to threaded parts where they serve as an anti-seize medium in such cases where oil cannot be used. Zinc also offers cathodic protection to certain aluminum alloys, and has been attached as expendable zinc lugs to aluminum equipment, where it dissolves in preference to the aluminum. Zinc could likewise be applied as an electroplate to protect such aluminum alloys.

Zinc may be deposited from the pyrophosphate type electrolyte over the zinc immersion coating, and under some conditions it may be applied over the anodic coating. However, the procedure shown in box is much more simple than





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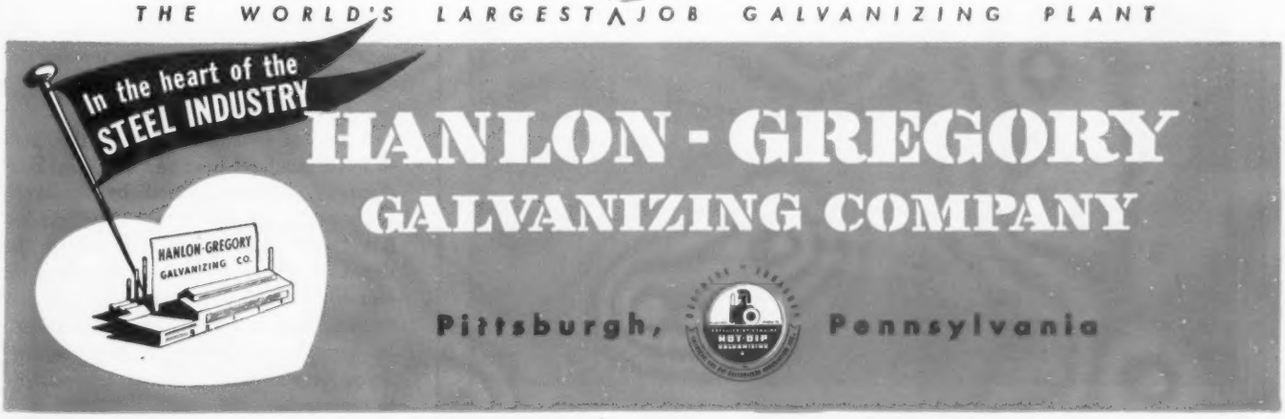


HOLE DUPLICATOR

. . . applies mass production efficiency to short runs and irregular shapes of steel plate

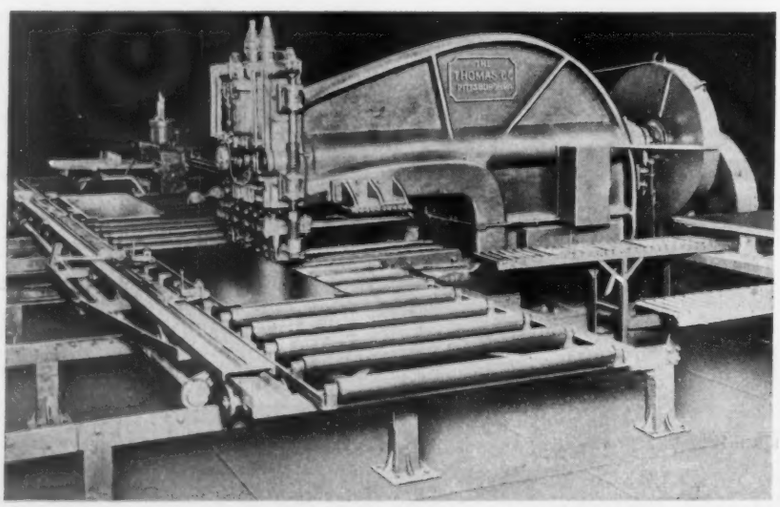
PUNCHING short runs and irregular shapes with mass production efficiency is made possible by a duplicator which meets the need for rapid, accurate duplication of holes, notches, coping and other operations in plates and panels in runs of two to several thousand. It was developed to overcome need for hand marking, hand positioning, and use of two or three machines where coping, notching or different size holes are required. It is particularly useful where many varieties of plates are handled, because it requires no setting up and can be switched instantly from one type of job to another.

The duplicator, made by Thomas Machine Mfg. Co., Pittsburgh, comprises a deep throat punch with solenoid control clutch, templet pin cluster connectetd by shafts to a punching tool head, and an all-steel table carrying rollers to support plates to be punched. Roller bearing track wheels support table, which is moved by pinions engaging track racks and controlled by a handwheel.

In operation, plate and templet are clamped to a heavy channel section carriage. Using the handwheels, operator moves templet under desired locating pin. By a footswitch operating a solenoid, he forces the pointed locating pin down through the hole in the templet. This pulls the table into position under the punch, also operating the gage on the punching tool selected and engaging the punch by means of solenoid; and the punching is made.

Operation is as simple as following a tracing. Holes can be punched diagonally or in any direction. As many as 11 tools, including round, square and slotting tools, may be set in the punch. When shifting from one tool to another, a lever is merely thrown to select the tool wanted.

An oscillating stripper is provided to hold light work where distortion might occur. Rollers on each side of the punch are spring mounted so the plate rides free of the dies. The duplicator has an accuracy of between 1/64 and 1/32-in. Size of holes which may be punched vary from the smallest to 6 in.



either of the procedures described previously.

Commercial Possibilities

With a wider commercial application of electroplating to aluminum alloys impending, further refinements in the basic procedures in plating on aluminum will undoubtedly result. In the zinc immersion procedure a method for plating upon aluminum is available which is applicable to all the aluminum alloys commonly encountered with only minor variations in preliminary cleaning operations.

Many different aluminum alloys are being used commercially and these exhibit widely different properties. In the past there has been disclosure of many plating procedures for aluminum having only limited usefulness because they were applicable only to certain alloys and not common to the entire group. There are, in the case of the zinc immersion process, some differences in the results obtained depending upon the physical properties of the alloy, whether it be of wrought or cast structure. However, the bond in all cases appears to be stronger than the cohesive strength of the base metal. No more than this can be expected of any plating procedure.

The use of an aluminum oxide bonding layer is also generally applicable. The electroplating results obtained are equally as good as those obtained by the zinc immersion process, but the oxide procedure is more critical and requires more time and equipment than the zinc immersion procedure. Thus, for most purposes the anodic coating procedure is generally considered to be of secondary importance.

REFERENCES

[1] H. Bengston, Trans. Electrochem. Soc., 88 (1945).

[2] "Alumon" process, Enthone Co., New Haven, Conn., U. S. P. 2,142,564, based on zincate dip containing copper in form of a complexion.

[3] U. S. P. 1,627,900 (1927).

[4] Process of the Ziolite Corp., Worcester, Mass.

[5] "Unichrome" Bath—product of United Chromium Inc., New York.

[6] U. S. P. 1,971,761 (1934); also proceedings Electroplaters' Soc. (1942).

[7] U. S. P. 2,036,962 (1936).

[8] Process of Hanson Van Winkle-Munning Co., Matawan, N. J.

—o—

A line of resistance welding tips, said to have excellent heat and electrical conductivity, is now offered by Stackpole Carbon Co., St. Marys, Pa. Two grades, RW-1 and RW-2, are reported to be direct result of specialized wartime research for use on extremely difficult spot welding applications. Both materials can be supplied to practically any required shape or size and to usual tolerance, it is reported.

One of the two wheels above was in use for four months on a charging machine where it was daily subjected to repeated loadings of 300,000 pounds. Previously, regular carbon steel wheels would mushroom and have to be taken out of service in two weeks, thus presenting an expensive maintenance problem involving three men to make the replacement. A heat treated wheel of Jalloy steel was substituted and after four months' service removed for inspection. It is the wheel on the right. No appreciable wear can be seen when compared to the wheel beside it that was never in service. If you have an application that requires resistance to abrasion, fatigue and high impact strength write to us about heat treated Jalloy.

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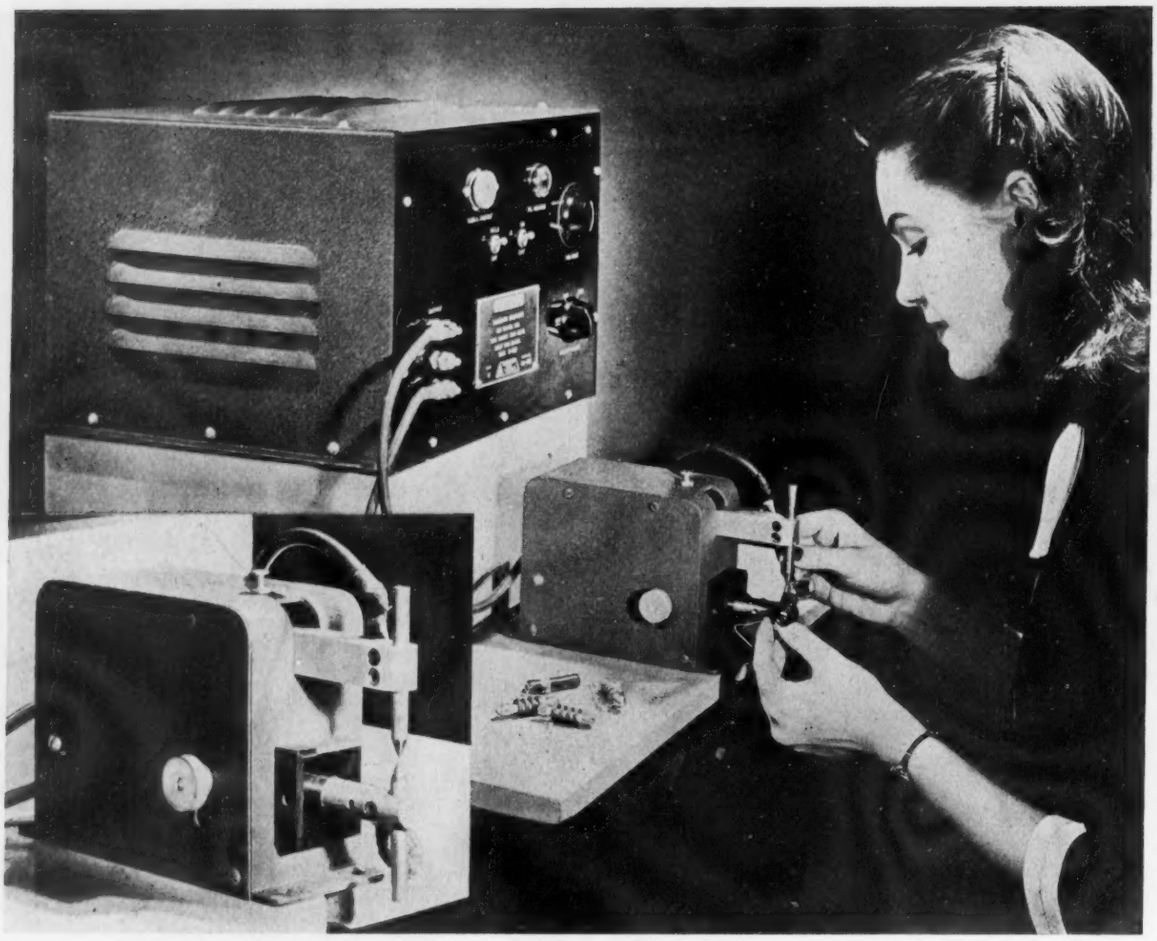


Unit has many applications in industry, particularly in manufacture of small jewelry, electrical equipment, electrochemical apparatus and radio parts. (Inset) Closeup of welding head

110-volt welder

By using energy stored in interval between welds, small spot welder gives high voltage performance on metal of relatively high thermal conductivity

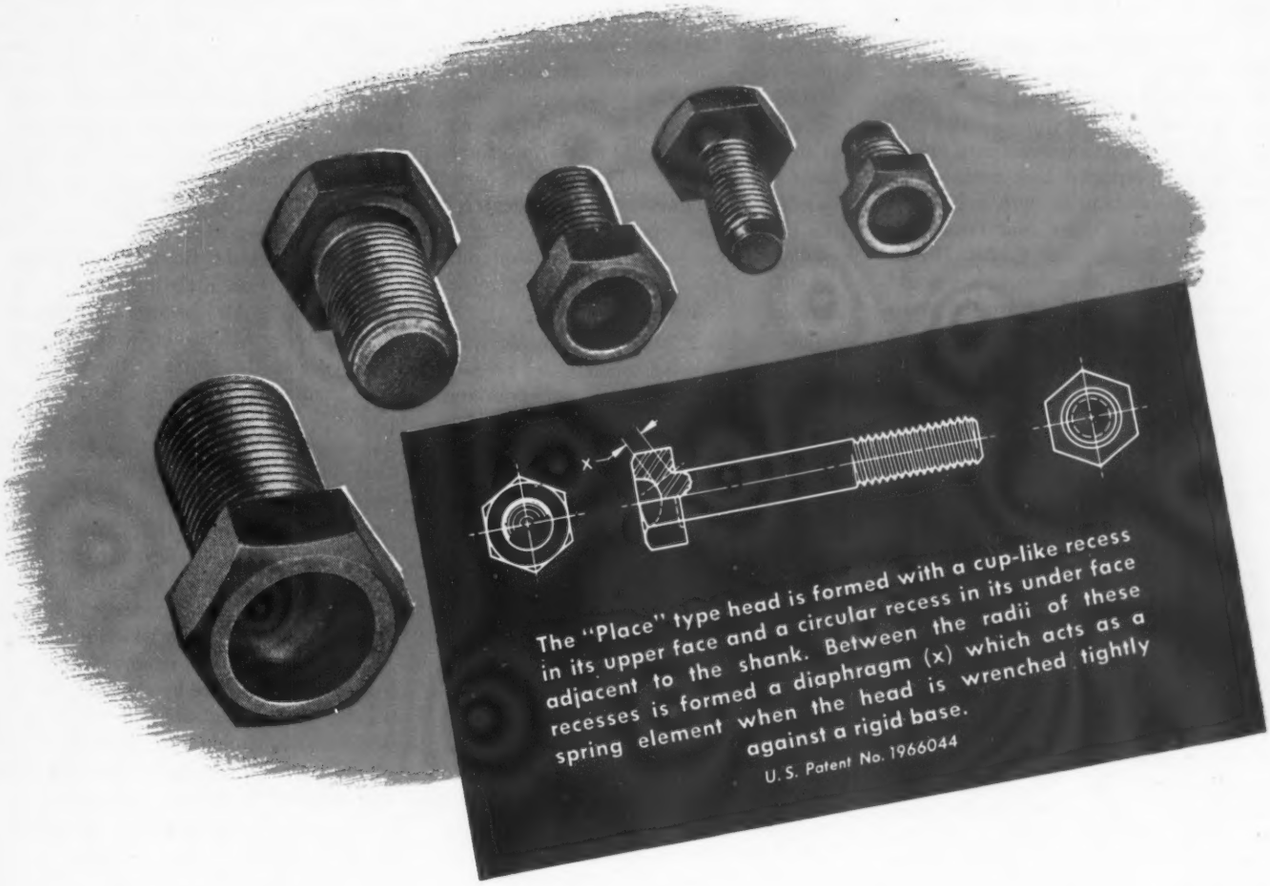
ELECTRONICALLY controlled welding is now available in a minature weld power unit produced by Raytheon Mfg. Co., Waltham, Mass. It does away with necessity for human element of control of the quality of the weld.

The unit is small, measuring 13 1/2 in. long, 13 in. wide, and 9 3/4 in. high, and is capable of producing 60 to 120 welds per min on a total thickness of 0.035-in. for practically all metals and principal alloys, or combined pieces being welded of 0.060 to 0.070-in. in cross wire welding.

Installation is simple—welder can be plugged into any source of 110-125 v, 60 cycle current. Current drain averages only 3 amp at maximum setting. Power output into weld can be varied. A voltage adjustment control varying the capacitor charging voltage from 750 to 1500 v and a 3-position capacitor switch by which values of 14, 28 or 56 microfarads can be attained, are mounted on front panel of control unit.

The welding head, which is separate from control unit, is designed to give pre-set pressure to material being welded when pressure is applied, power being released by a microswitch mechanism in the head. Operation is set off by foot pedal.

Metals that may be welded include iron, aluminum, copper, nickel, tantalum, platinum, tungsten, gold, constantan and stainless steels. High thermal conductivity metals such as copper and aluminum ordinarily require comparatively heavy welding currents, but this unit, working on a stored energy principle, accumulates and stores energy in the interval between welds. While energy delivered to welding heat exceeds instantaneous demand on the 110 v source, the current drawn from the line is relatively stable.


The "Place" type head is formed with a cup-like recess in its upper face and a circular recess in its under face adjacent to the shank. Between the radii of these recesses is formed a diaphragm (x) which acts as a spring element when the head is wrenched tightly against a rigid base.
U. S. Patent No. 1966044

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THE NATIONAL SCREW & MFG. CO., CLEVELAND 4, O.

Blast Furnace Conference

(*Concluded from Page* 141)

blast furnace, consequently coke made from the experimental coals was charged into one or more blast furnaces and careful check data kept. Summarizing results, Mr. Gardner reported best furnace performance was obtained with a blend of coal containing 35 per cent Pocahontas No. 3 and 25 per cent Eccles. He observed also that his company's research demonstrated how lacking are the means for determining safe and dangerous expansion of coal during carbonization, as well as means for determining the best blends of coal.

A tapping hole survey made during the past two years and embracing 134 of the country's blast furnaces was reported by its author, D. P. Cromwell, superintendent blast furnaces. Campbell Works, Youngstown Sheet & Tube Co., Youngstown, O. With the trend of recent years to build blast furnaces approaching 2000 tons daily capacity, the matter of maintaining tap holes becomes more complicated and a possible source of lost time.

The survey indicated that burning out of coils occurs mostly on furnaces tapping five times per day, Mr. Cromwell observed. The trend appears to be toward use of the electric clay gun. About 48 per cent of tap holes are drilled at 20 to 24 degrees, an angle which produces some syphon effect. Recommending best procedure for stopping the hole, he emphasized that clay must be carefully selected, well mixed and not too wet.

From the long range viewpoint, the concluding session of the conference dealing with ore probably had the greatest economic significance. Rapid depletion of the nation's high-grade reserves during the past five years or so has become a matter of grave concern.

Ore reserves from a geological point of view was a subject discussed by L. P. Barrett, vice president, Interstate Iron Co., Pittsburgh. This speaker was not inclined to be as pessimistic on the immediate future outlook for high-grade ore as some so-called government experts. He mentioned a government report of some time back which stated that one important deposit would be exhausted in 1945 and the nation would have to depend on second-grade ores by 1952. Mr. Barrett reminded the audience that the range supposed to have run out last year is still producing in heavy volume, furthermore, it is not likely that all high-grade ore in the Lake Superior district will have been consumed in another six years. The speaker was not intent upon minimizing the country's dark outlook on iron ore—rather he was attempting to get a truthful answer as to how long high-grade ores actually will last.

Mr. Barrett did not come up with an answer in number of years, but he did analyze prospects at Lake Superior ranges sufficiently that some reasonable conclusions could be drawn. Prefacing his analysis, he said that today underground ore can not compete with open pit, but in the future it may. Ore falls into three main classifications: (1) That which requires no treatment, and, incidentally, the bulk of our present supply; (2) that which can be beneficiated without fine grinding; and (3) that which requires fine grinding and concentration.

His appraisal of various ranges was: Mesabi—substantial tonnage can be produced by new discoveries, extensions and ore dressing; Vermilion—underground—may be forced out for economic reasons; Cuyuna—substantial future; Gogebic—economic conditions severe—once closed probably would be permanent because of prohibitive cost of reopening; Menominee—prospect not good for low phosphorus but good for high phosphorus—latter long way from fully explored; Marquette—will be shipping when others are exhausted—only one-sixth explored in some areas.

Recapitulating the foregoing appraisals, Mr. Barrett forecast the total ore probably will last the lifetime of those in his audience, but shipments will pursue a descending pattern. After exhaustion, iron supply must come from taconite.

Warning Is Sounded

It remained for George W. Hewitt, assistant vice president in charge of operations, Wheeling Steel Corp., Wheeling, W. Va., in discussing Mr. Barrett's address, to sound a note of solemn warning over our rapid depletion of high-grade ore reserves. During the past six years, he asserted ore shipments averaged 80 million tons a year and we can not go along at that pace for another six years. He warned that the country must not let beneficiation lag, but must pursue it actively as a conservation measure and safeguard against the future.

Regarding beneficiation, one speaker stated it would be necessary to spend $500 million to get 50 million tons of ore from taconite. This would mean ore at about $14 a ton. Mr. Barrett felt the figure might be closer to $18 to $20 a ton.

War years have brought economical beneficiation closer, declared Walter Maxson, director of research, Oliver Iron Mining Co., Duluth, in an address on quality and characteristics of the future iron ore supply. He pointed out that in the past five years Lake Superior shipments doubled the past three decades, and the peak year was 30 per cent over the previous peak. This rate of exhaustion has hastened the day when beneficiation will be required on a large scale.

Mr. Maxson asserted that during the period that beneficiation is undergoing development and application, ore quality will drop in comparison with present high-quality ore, and this situation will force blast furnace operators to adjust their practice. In 1944, mines shipped 158 different grades, indicating the close control which mines maintain over their operations. This age of many grades of high quality is coming to an end, the speaker warned, and blast furnaces will have narrower selection in the future.

Emphasis to Mr. Maxson's comments were made by Mr. Strain, who said that in our use of the cream in the past, we have been stealing from the future. This applies to both ore and coal, he declared, and suggests that from here on the job of blast furnace operation is going to be tougher.

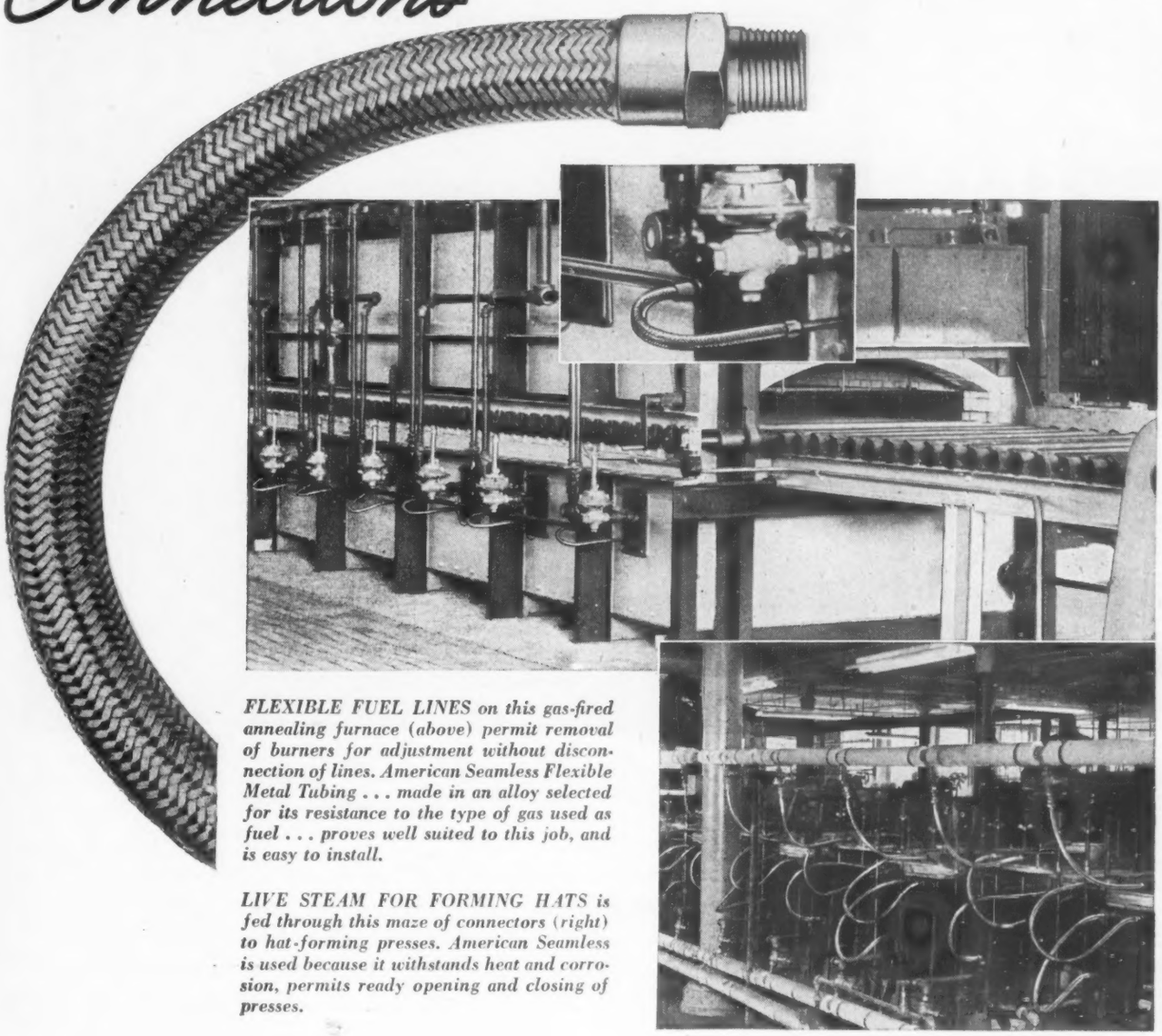
A paper prepared by H. K. Work, manager of research and development, and F. M. Hamilton, Jones & Laughlin Steel Corp., Pittsburgh, and presented by the latter, described research which that company has conducted on removal of sulphur from high-sulphur ore by sintering. It was pointed out that high-sulphur ores not desirable now would be acceptable if sulphur removal can be accomplished by sintering and in an economical manner.

The research was started by preparing synthetic ores, one containing sulphates and the other sulphites, and processing them in an experimental plant. Pyrites were introduced into one ore and gypsum into the other. The pilot plant tests approved that sulphur removal ranging from 90 to 94 per cent could be accomplished. Actual runs then were made in the sintering plant using high-sulphur ore, and the test results were fully confirmed. Mr. Hamilton pointed out that particle size of the ore affects sulphur removal and indicated ¼-in. as the maximum size. Over this, results are doubtful. In sintering high-sulphur ore coke size was the same as in normal practice—namely ⅛-in. or less.

In bringing the committee's two-day sessions to adjournment, Chairman Boynton commented that blast furnace and coke plant problems of the future are going to be considerable and will require close co-operation of all raw materials interests. To this end, it is proposed that sub-committees will be organized during the coming year to provide co-operative representation. He expressed confidence that operating problems of the years ahead will be solved and without as much dislocation as might be expected.

Mr. Boynton said that the American steel industry made winning of the war possible and continues to lead the world because competitors exchange views and information freely to the profit of all. No other nation on the face of the earth exhibits such freedom.

Flexible Connections to FURNACE and PRESS



FLEXIBLE FUEL LINES on this gas-fired annealing furnace (above) permit removal of burners for adjustment without disconnection of lines. American Seamless Flexible Metal Tubing . . . made in an alloy selected for its resistance to the type of gas used as fuel . . . proves well suited to this job, and is easy to install.

LIVE STEAM FOR FORMING HATS is fed through this maze of connectors (right) to hat-forming presses. American Seamless is used because it withstands heat and corrosion, permits ready opening and closing of presses.

HEAT, vibration, pressure, movement, abrasion or corrosion may very well raise havoc with the type of flexible connections you now employ. If so, look into the possibility of doing a better, safer, more economical job . . . with American Flexible Metal Hose or Seamless Flexible Metal Tubing.

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Rustproof Coating

Survives Die-Stamping

A NEW rustproofing technique for steel and galvanized steel which deposits a coating of from 5 to 15 millionths of an inch (0.000005 to 0.000015-in.), will protect stock during manufacturing stages and permit a tighter bond with paints. Called the Banox process, and developed by Calgon Inc., subsidiary of Hagan Corp., Pittsburgh, the coating consists of a glassy metal phosphate, so plastic that it will bend with the steel or permit die-stamping without harm to the coating.

The process originally was used for a protective precoating for painted steel shell containers during the war. Formerly, humid, salt-laden atmosphere stripped paint along with vital identification from containers. Banox treatment was successful in overcoming this condition.

Chemical used is inorganic and insoluble and allows a considerable latitude in coating time by altering the working concentration. Process is operated at normal temperature and requires no heat to produce a simple, effective and economical coating on steel, zinc and other metals and alloys. Calgon states that good coatings have been produced in actual practice in as short a time as 10 sec at 80° F. As it relies on chemical rather than mechanical bonding, it holds organic finishes to metal with greater tenacity.

Banox treatment is said to accomplish four purposes: Preventing rust between cleaning and painting; insuring a grease and alkali-free surface; increasing durability of finish as measured by outdoor exposure, salt spray and other tests; and preventing spread of rust from unprotected edges where base metal is exposed.

Applied by spray, immersion or brush, steel so coated resists rusting in plant atmosphere for as long as several months, Calgon states, thus affording temporary protection of units or assemblies before painting. Process surfaces are relatively nonporous.

Process requires no special equipment as chemical is noncorrosive to tanks and applicators. Its simplicity and economy derive from low cost of chemicals per unit area of metal treated. As application is satisfactory at room temperature, no heating elements are necessary.

Chemical control of process also is simple, as treating solution may be replenished by addition of more compound, or renewed at low cost. In large applications—as in primary production of treated steel—process may be controlled by a simple, rapid chemical test or by a check of the coating weight.

The process can be used by the steelmaker, by the converter or final fabricator of consumer goods. Product was intended to improve the finishing of automobiles, refrigerators, gas and electric ranges, deep-freezing units, stokers, household appliances and the like.

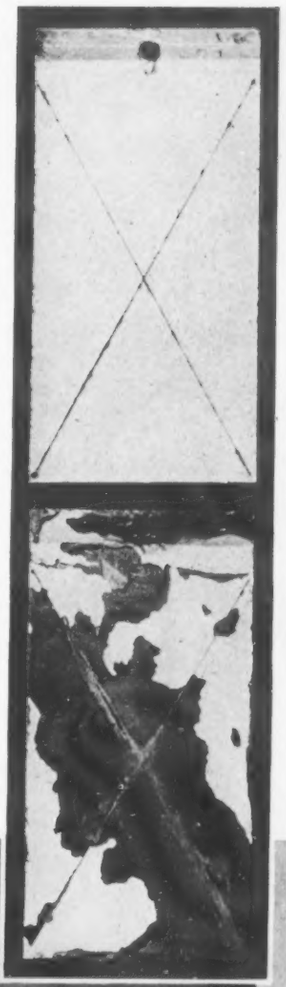


Fig. 1 (right)—Painted steel panels after exposure to standard salt-fog corrosion test for 300 hr at 95° F. Panel at top was treated by Banox process prior to painting. Other panel received no treatment prior to painting

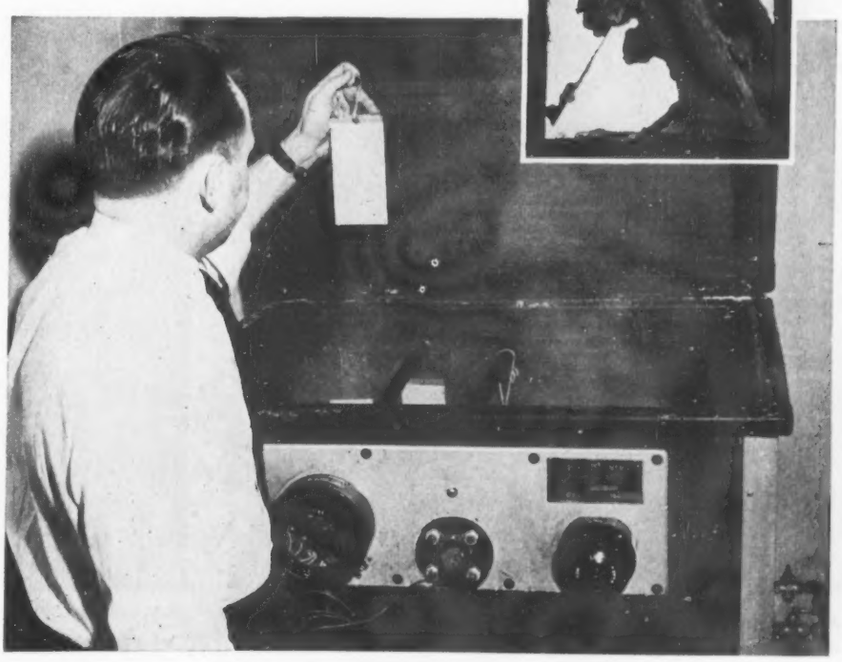
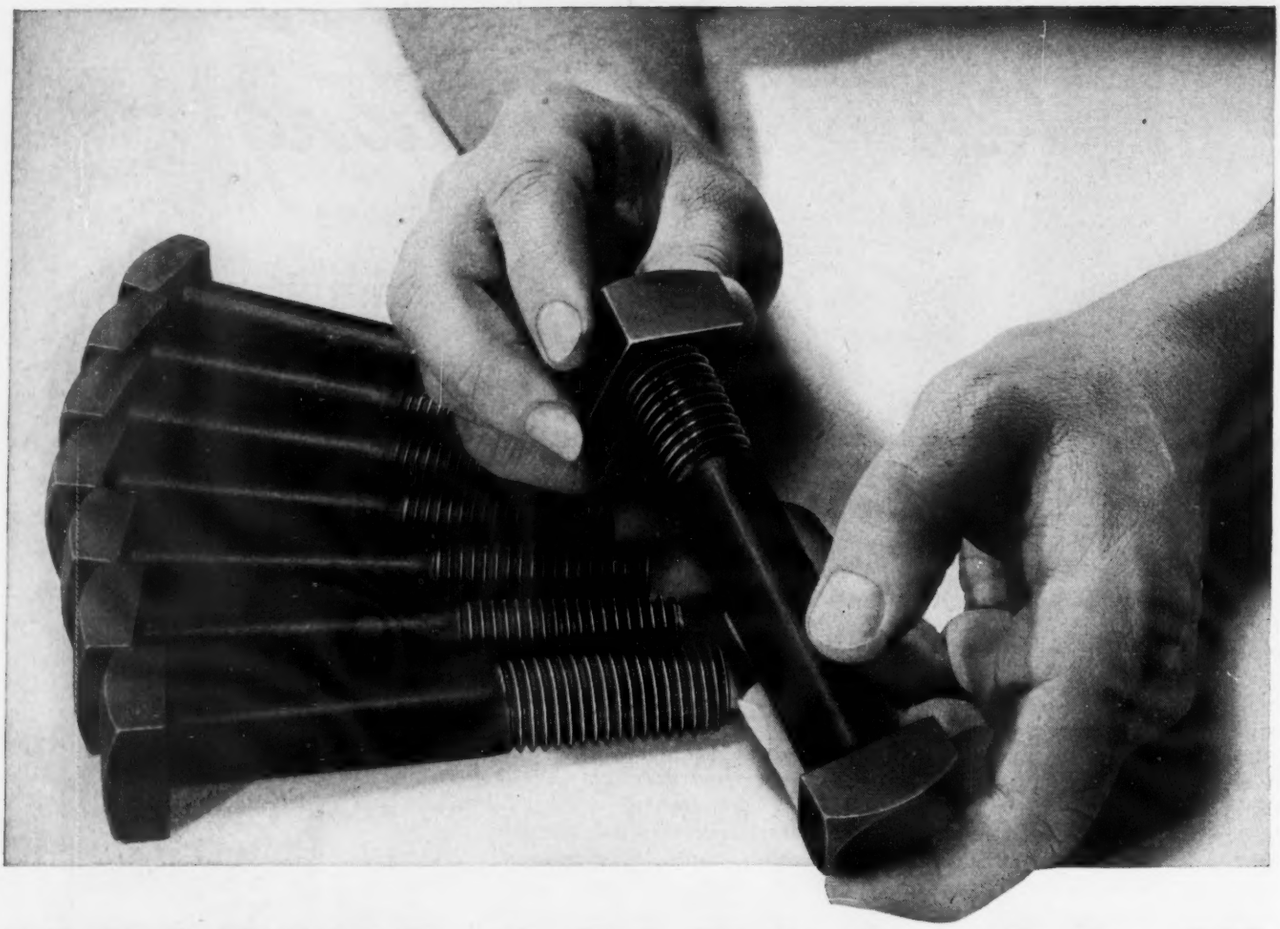


Fig. 2 (below)—Salt-fog corrosion cabinet showing painted steel panels being tested



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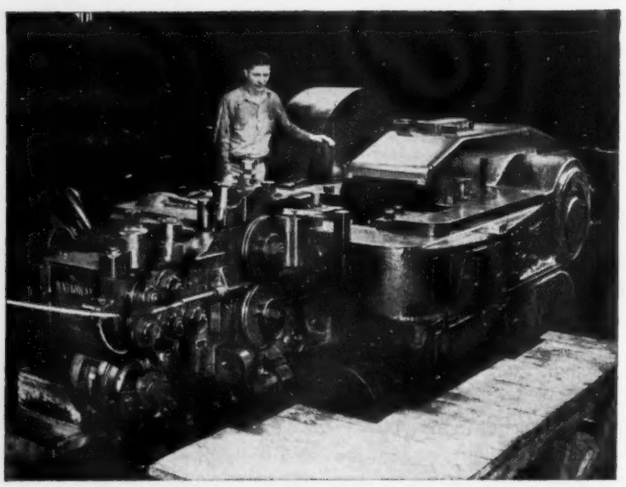
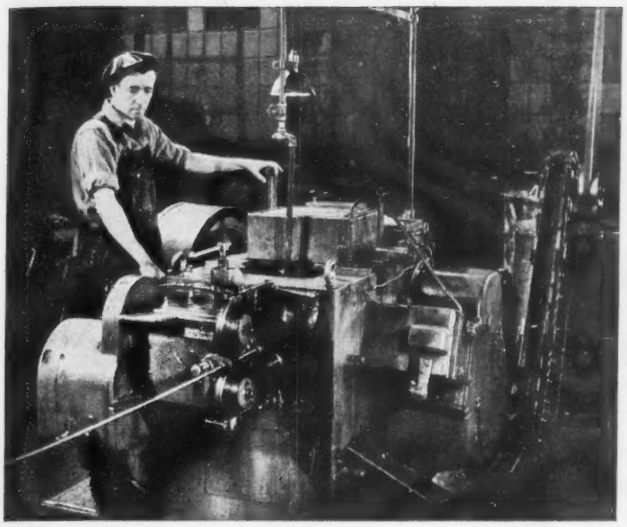
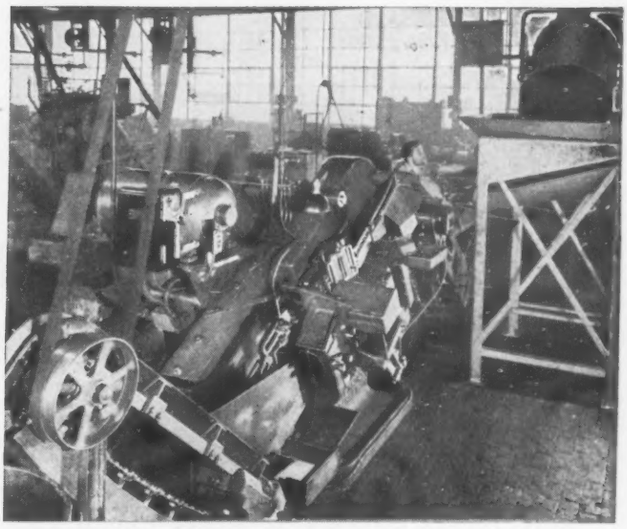


SOLID DIE — This big machine which cold heads in solid dies — insuring maximum accuracy and soundness — indicates scope of RB&W equipment.



HIGH SPEED HEADING — 11,220 pieces an hour is the rate of this ¼" header.



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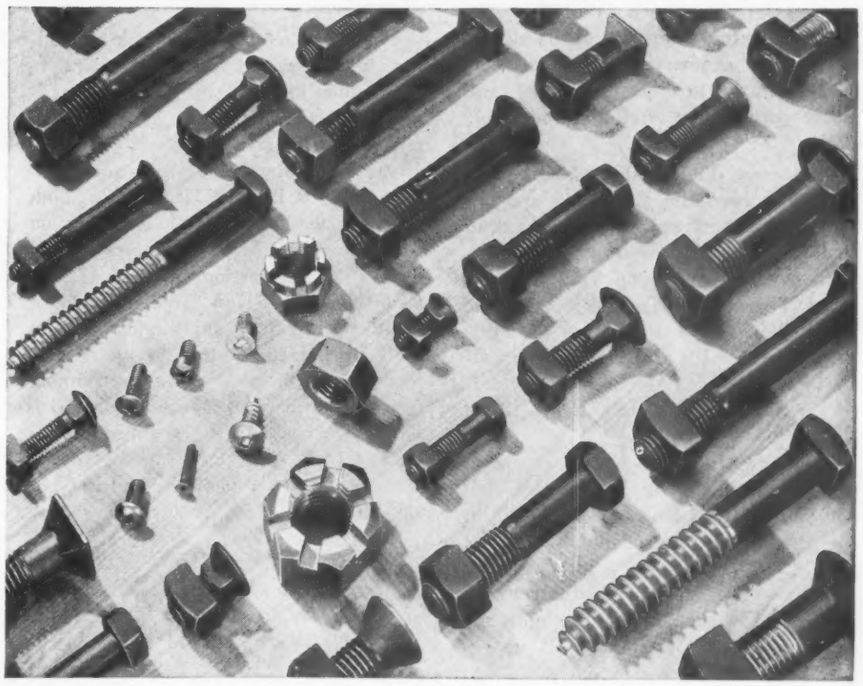

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By GUY HUBBARD
Machine Tool Editor, STEEL

Machine Their Tooling and Electrification— Get Drastic Postwar "Shake-Up"

Technique of "forging swords into plowshares" is subjected to concentrated impact of three major meetings and a national tool show, and is jarred loose from prewar ideas

AFTER a considerable lapse of time during which industrial exhibitions, conventions and technical meetings on a national scale were ruled out by governmental restrictions born of the war, the machine tool industry and the closely related tool engineering profession certainly did a lot to make up for lost time in the period from April 8 through 17, 1946.

Concentrated into that week and a half were: The New Era Exposition and annual meetings staged by the American Society of Tool Engineers at Cleveland, April 8-12; the Machine Tool Electrification Forum held through courtesy of Westinghouse Electric Corp. at Pittsburgh, April 9-10; and the spring meeting of the National Machine Tool Builders' Association, Atlantic City, April 15-17.

These events were of such character that many—including the writer—felt duty bound to attend all three. That constituted a hectic schedule, to put it mildly. All of us got a lot out of it, at least within our limited ability to digest mentally such a quantity of information so fast. Most of us still are engaged in that process of digestion. As a matter of fact, that process will be going on throughout the metal working industries of the United States and Canada for a long time to come.

The tool show was both well named and well timed. Had it been many months earlier, attendance of 53,831 could not have been rolled up, nor would a lot of the new tooling developments have been in shape to show. Had it been several months later—say in the Fall of 1946—it would not have caught conversion programs at the critical stage at which the new tools, equipment, materials and techniques could be worked into those programs. As things turned out, it caught hundreds of these programs at exactly the point where tool engineers can better them on the basis of things learned at the exhibition and at the technical sessions.

The broad scope of the work of modern tool engineers, and the extent to which they influence manufacturing programs, was brought out clearly in an address by Ralph E. Flanders, president, Bryant Chucking Grinder Co., and chairman, Jones & Lamson Machine Co., both of Springfield, Vermont. Speaking on the subject, "Tool Engineering and Profits" at the session on April 11, Mr. Flanders said: "How large the field of usefulness of tool engineering is, can well be judged by the variety of subjects on the program of this convention. You deal with plant layout and materials handling; inspection gages; cutting fluids; cutting tools; permanent molds; special machine design; economics; and last but by no means least, profits.

Tool Engineers Key Men

"Tool engineers first decide on the sequence of operations by which the parts of a mass produced product shall be made. This in turn determines plant layout if the plant is being tailored to the product. It also involves the equipment for moving the parts from operation to operation. In this initial problem, you have to consider, what is most profitable? What is the expected scale of operations?

If small, the plant layout will be simple and the handling of parts will be by the most obvious means. If large production is contemplated, you will go into such refinements as will give the lowest cost of production for the rate of production in prospect.

"The same good judgment must be applied to selection of production machinery. If planned volume is small, you will to a large extent use standard machine tools. If, on the other hand, expected volume is great, you will in many instances be justified in designing, or having designed and built completely special production machinery. Care must be taken lest investment in special machines be so great as to result in heavy losses when product design changes are forced upon you.

"On interchangeable manufacture on almost any scale, fixtures are essential. They save time and therefore cut costs in holding work in machines. They enable work to be held firmly and without distortion in proper position, even though the operator may have had only a few hours of training, thus making high skill on the job unnecessary.

"A well designed fixture saves time, cuts cost and increases production, and it is up to the tool engineer to design them to those ends. Bear in mind, however, that elaboration and consequent cost of a fixture must bear proper relationship to cost of operation and value of parts produced.

"What has just been said of fixtures is equally true of drilling and boring jigs. Oftentimes satisfactory duplication of accuracy even on small volume production is impossible without jigging, except through use of an expensive jig borer requiring highly skilled, costly operation.

"As far as cutting tools are concerned, various carbides have really only begun to revolutionize machine shop processes. Effective use of carbides in any progressive production plant will hereafter dominate your determination of processes, selection of equipment, and — through its influence on feeds and speeds—will determine the amount as well as the kind of production equip-

Tools . . . .

ment. There also are equally important possibilities in scientific development and selection of cutting fluids."

Mr. Flanders went on to detail the important work of the tool engineer in planning of inspection and design and selection of instruments, in assembly methods, including assembly jig design; in setting of tolerances on fit and finish, and as a consultant with product engineers to the end that designs will make for efficient production.

In conclusion, he said: —"Thus the tool engineer plays a major role in producing large volumes of serviceable, useful products at low cost. He is responsible for so organizing production that the desired volume and quantity of output can be obtained by the transfer of the skills of mechanic and tool maker to jigs and fixtures, which can be used by semi-skilled operators. The tool engineer is indeed at the center of our industrial system. As a result of his work, we have higher production and good profits at low cost.

Good Low-Cost Products Essential

"Let me emphasize that good production at low cost is the essential factor in a high standard of living. What good are higher wages per hour, if there are no more goods to buy with those wages, or if the goods themselves are high in price? The foundations of a high standard of living comes from greater individual output of better goods and services. To this high social end the tool engineer devotes his life."

Bearing out what Mr. Flanders said it is significant that of the 368 exhibitors participating in the tool show, the largest number showed the following classes of things: Cemented carbide tooling; pneumatic and hydraulic devices to expedite loading, holding and unloading work to keep pace with carbide machining; and quick-acting and automatic gaging devices designed to keep pace with high production of high accuracy work. Pneumatic, electronic, sonic and optical projection gaging methods gave ample testimony of the rapid penetration of "laboratory methods" into the shop.

The amazing degree to which manufacturing operations today are subdivided was indicated by various machines for the mass reproduction of shop drawings—some of them being capable of turning out prints at the rate of a mile every four hours. It was pointed out that the average automobile design today requires as many as 65,000 prints before cars start rolling off the line for eagerly waiting customers.

One of the memorable events of the ASTE doings, as far as the writer is concerned, was a meeting in a small group with George T. Christopher, president and general manager, Packard Motor Car Co., who was guest speaker at the banquet. Mr. Christopher is a man who came up through the shop "the hard way" and is the personification of good old fashioned common sense both in production and economic matters. In other words, he is a tool engineer who is applying his knowledge of men and machines in the management of a large and successful company.

He referred to tool engineering as "the incubator of the mass production urge." Upon tool engineers, he believes, rests the primary responsibility for continually improved consumer goods at reasonable prices, despite constantly rising wages. Speaking of government restrictions, he remarked: "No automobile company would be foolish enough to price itself out of competition if restrictions should be removed."

When questioned as to whether war enforced long use of old model automobiles had not shown up weaknesses in design, he replied: "That is what you think, because you were used to trading in your car every year. The other fellow who always bought an old car would consider your present car to be a honey. The situation simply is that all the people who used to drive new cars now have to drive old ones. The cars themselves actually have shown up extraordinarily well."

Men like Mr. Christopher did not have the benefit of formal education in tool engineering. As a matter of fact, that has been true right up until recently of most of the 30,000 tool engineers here in the United States. Otto Winter, chairman, ASTE Educational Committee announced that $75,000 of the Society's funds have been set aside for establishing an educational program which will help toward the training of the 60,000 more tool engineers now needed in American industry. This fund will go for text books and toward setting up courses—including those in leading colleges and universities.

The overall impression of the ASTE doings in Cleveland, according to one experienced observer, was this:— "Unquestionably we are tending in the direction of mechanisms which pace the workers instead of workers pacing mechanisms—the ultimate end apparently being mechanisms which will require no work on the part of workers!"

So much for that. Now let's take a look at some things that took place at Pittsburgh, where more than 400 men from the machine tool industry spent two days in catching up with electrical developments affecting machine tool design. The writer was one of a small group which gathered at the Westinghouse works in East Pittsburgh in 1936 for a similar purpose. It was a far cry from the simple control circuits which 30 or 40 of us studied at that time, to the electronic devices studied by more than 400 at the 1946 Forum. The push button could well have served as the symbol of the 1936 affair. By the same token, a vacuum tube would have been a more fitting symbol of the 1946 Forum.

Mechanical-Electrical Engineer Close

Little by little mechanical engineering and electrical engineering have drawn closer and closer together in the machine tool plants, until today it would be impossible to get a thin feeler gage between them. The same thing is true of hydraulic and pneumatic engineering.

That the exchange of ideas between the machine tool industry and the electrical industry is give-and-take in both directions is borne out by recent improvements in motors and controls for machine tools. The controls have been made more and more rugged and motors have been made more and more accurate as far as vital dimensions are concerned. Both have been redesigned for better appearance—appearance more in keeping with machine tool appearance standards and surface finish.

James R. Weaver, manager, Westinghouse, East Springfield, Mass., works gave some suggestions as to large users' needs. Space, he said, is an important factor in production. Therefore machine tools should be kept as compact as possible. Inclination to learn trades is becoming less and less. Therefore machine tools must supply the skill formerly possessed by the man. By the same token, maintenance must be simplified. Repair parts must slip into place without any "fitting operations" on the part of the machine tool user.

"As a manufacturer," said Mr. Weaver, "my experience is that the best quality and lowest cost production is obtained by making all manufactured parts to our closer tolerances. Any tightening of tolerances invariably results in faster and surer assembly and a better product—

also a much improved overall economy."

Closer tolerances will demand more rigid machine tool construction, this also being required because of fast metal removal. Control of thermal expansion also must be sought. It may be that this will require use of construction materials such as Invar and refrigeration of certain parts of machines.

Another desirable objective, according to Mr. Weaver, is the "pre-setting" of cutting tools to attain tolerances without a lot of "cut-and-try." This may involve built-in gaging apparatus which will measure tool settings rather than the work itself.

Swinging next to Atlantic City, we found a large group of executives of the machine tool industry spending three days exchanging experiences in that interim between war and peace. One of their big problems is that of the overhanging surplus of government owned machines. No one seems to know how many there are. The general feeling seemed to be that if the government would hurry up decisions on which ones are surplus and which should be retained for national security—and then get busy on quick and orderly sale of the surplus—things would be better all the way around.

There is a generous attitude among the builders as far as co-operating with would-be purchasers of surplus tools is concerned. Most of them are ready and willing to give the history of any machine of their manufacture whose serial number is known. That can be tremendously helpful in avoidance of pitfalls such as getting a special machine when a standard model is wanted.

James Y. Scott, president, Van Norman Co., Springfield, Mass., who is chairman of the NMTBA Government Relations Committee cited some interesting figures on retention of machine tools by the armed services. Many now in the possession of RFC were sponsored by the armed services. These cannot be kept by the armed service without legislation permitting transfer of title. If this legislation passes, the Air Corps will set aside 40,000 machine tools and the Bureau of Aeronautics of the Navy an additional 26,000.

The Ordnance Department of the Army has earmarked 11,000 machine tools—mostly special machines essential in munitions production.

This reserve is in addition to those machines in established arsenals and certain other government shops. The Tank plant in Detroit, the Dodge-Chrysler airplane engine plant in Chicago, and certain others of similar character are to be retained.

The Navy Bureau of Ordnance has set aside about 650 large machines, averaging in value about $15,000 apiece. Here again the reserve is in addition to machines in the regular arsenals, which incidentally now are well equipped. The Bureau of Ships has reserved 137 very large machines difficult to find or to build in an emergency. Their average value is $58,000 apiece. In addition, that Bureau has reserved hundreds of machines for maintenance and repair work.

Mr. Scott is of the opinion that it might be wise to place all the reserved machines in a central government pool for the benefit of all the armed services. The art of war constantly is changing, and in that way the machines could be spotted wherever most needed on production of new kinds of munitions and new types of weapons in the event of another national emergency.

William P. Kirk, president of the association, reiterated the sentiment of most of the builders when he said: "As a national economic measure we must continue to assist in the sound disposal of government-owned machines that ultimately are declared surplus. We must do this so that these modern machines will be on useful production work—not rusting away in warehouses and out in open fields while more than 600,000 old 'clunkers' continue in operation, wasting electric power and manpower and turning out inferior consumer goods."

TiH Increases Density

(*Concluded from Page* 138)

sistance, plasticity, in fact all the good qualities of a metal can be relatively increased by the use of hot press procedure in place of the more commonly used cold pressure with subsequent heat sintering technique.

The reason for the rather infrequent use of this method is the very great die wear which accompanies it. Most steels or alloy combinations can not hold up, at least not for long time intervals, under the necessary elevated working temperature. Carbon molds or dies are used for cemented carbides successfully in hot press procedures, but for the more ductile metals that do not require such high temperatures carbon dies do not meet the requirements.

Principles utilized in the author's method are as follows: Hydrogen is slowly liberated at approximately 360° C, (680° F) from titanium hydride (TiH); a semi-hot press method is possible without an external reducing atmosphere and with a minimized die wall wear at temperatures in neighborhood of 750° F.

Approximately 5 per cent of TiH is intimately mixed with any alloy of metal powders of which 10 per cent will become liquid at a temperature of not over 700° F and which will sinter fully at a temperature above 1200° F. It is necessary to have this 10 per cent become molten below 700° F to provide the liquid stage necessary to promote diffusion and recrystalization. The sintering is done at temperature higher than 1200° F to permit the liberation of all of the available hydrogen.

Shown in the accompanying illustration is a drawing of an automatic fixture which has been found to provide considerable aid during production. A hydraulic press is used with a jig or fixture having a keyed strip in it that can advance and position itself to three positions, stopping each time under the top ram of the press.

In position 1, of the accompanying series of drawings, the powders are compacted and heated to 750° F. The hydrogen in the TiH is liberated internally before too much density is achieved. Many of the occluded oxides are reduced by this action. Also, attrition of the particles takes place which has a tendency to abrade the surface oxide films from the particles thus making it easier for the liberated hydrogen to reduce them.

During position 2 the top plunger of the die is pushed out and into an aperture made to receive it. Thus it is easily retained for the next pressing. Position 3 shows the work piece being ejected into a specially made box containing a nitrogen atmosphere which prevents re-oxidation at the higher temperature.

Sintering time in a reducing atmosphere can be cut down by about two-thirds inasmuch as approximately one third of the required work has been with this semi-hot press method.

Locomotive Radiator Headers

(*Concluded from Page* 139)

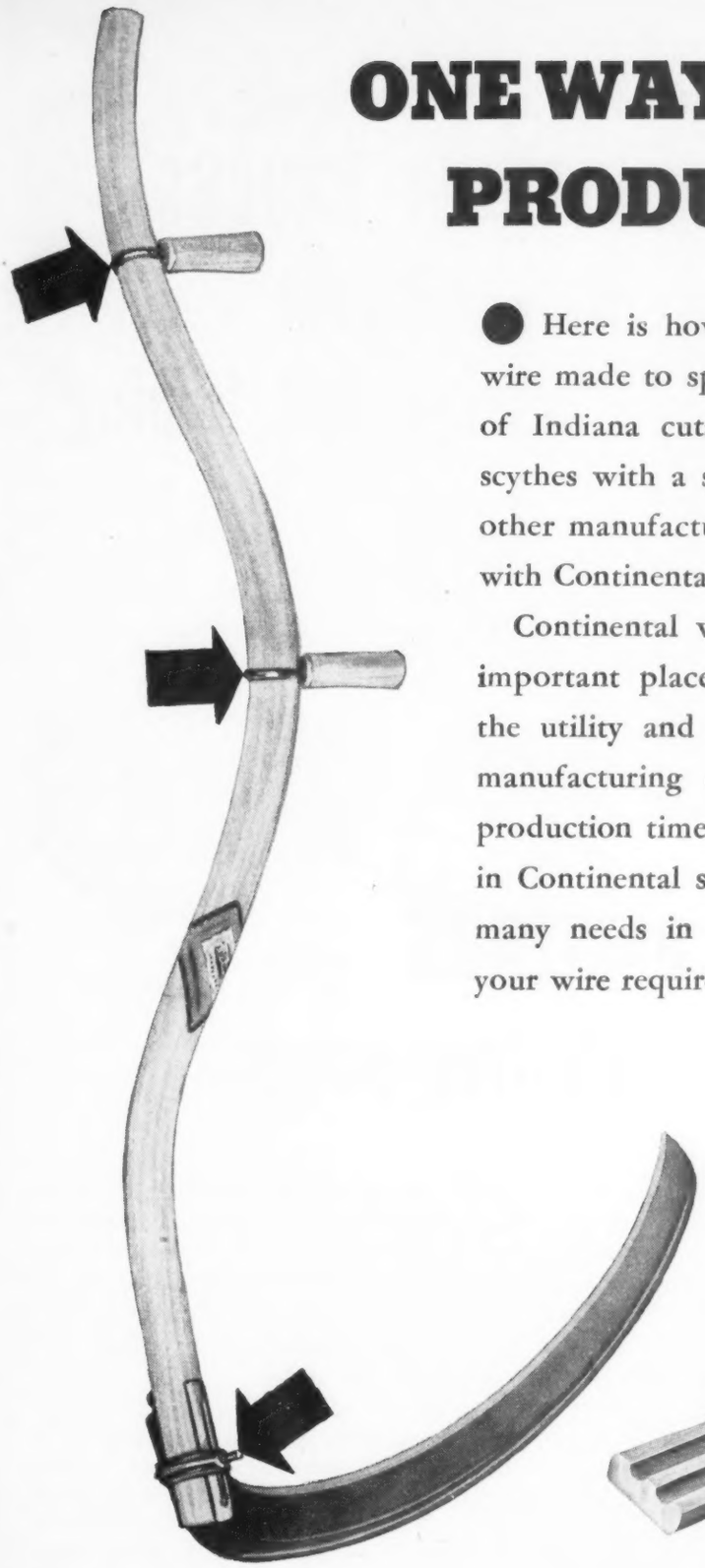
this equipment can be seen in Fig. 2.

The automatic welding procedure is started at one end of the joint and progresses along the seam at a rate of approximately 42 ipm. Fig. 2 also shows the operator adjusting the automatic welding head prior to the start of the actual welding operation.

The three longitudinal welds made in the structure are of the fillet type (See sketch, Fig. 3) and effect good penetration of the joints in the three pieces of material consisting of ⅜-in. formed stock and a ⅝ x 1¾ in. steel bar. Bare wire electrode of ⅛-in. diameter is used for the entire job, with 100 in. of wire being used per 73 in. of welding.

The granular flux which is deposited just ahead of the arc and which completely blankets the arc and molten weld metal from contact with the air, is fed from a hopper on the carriage. Surplus flux is recovered by means of a vacuum suction unit which can be seen at the right in Fig. 2.

ONE WAY TO "CUT DOWN" PRODUCTION COSTS



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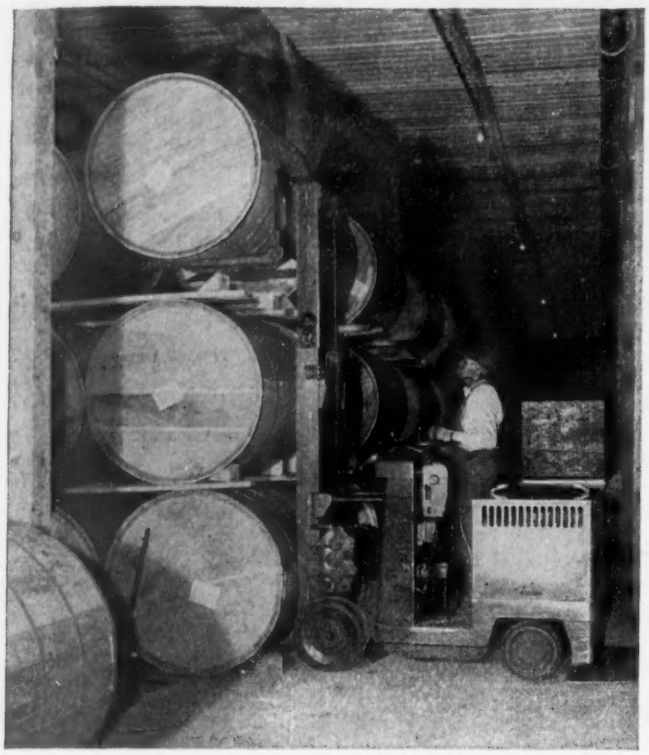
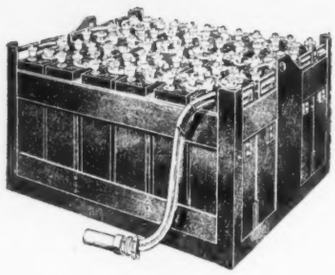


BATTERY TRUCKS work without "fussing and fuming"



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THERE is nothing temperamental about battery industrial trucks. Battery power and electric-motor drives give them instant self-starting, rapid yet smooth acceleration, and quiet fume-free operation. This makes for safe tiering, safe handling of fragile loads, safe operation in confined quarters or in the presence of fire hazards.

In addition to instant self-starting, battery industrial trucks consume no power during stops. This makes for high power efficiency in the stop-and-go service that is inherent in material handling work. And the current used for battery charging is low-cost power.

Electric motor drives have a minimum of wearing parts, thus minimizing maintenance, repairs and time out of service. With batteries exchanged at intervals of 8 to 12 hours, battery industrial trucks, in actual practice, give round-the-clock operation with a day-after-day regularity that you can hardly believe possible until you have had experience with them.

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ALKALINE BATTERIES

Fig. 1—Overall view of machine shop from engine lathe department

Power Trucks

. . . break production bottleneck by performing variety of jobs with combination of platforms and hook cranes. Relieve overhead cranes of all but heaviest loads

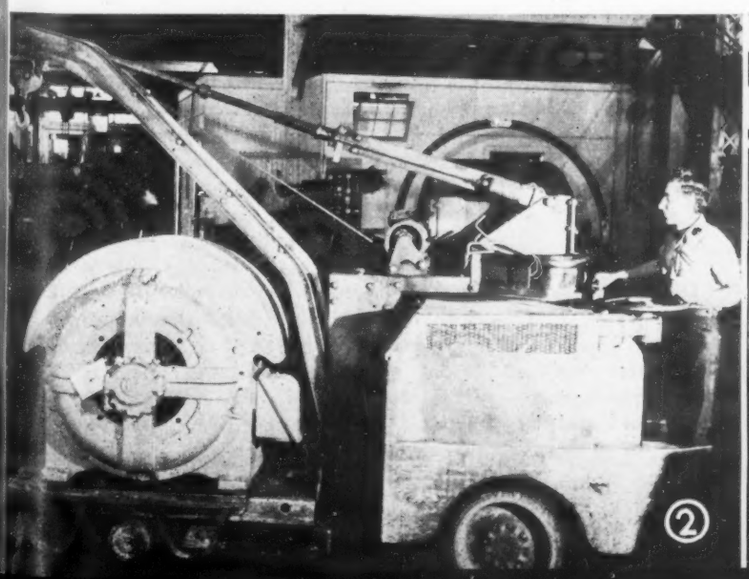
TWO battery-electric, low-lift, combination platform and hook-crane trucks, each of 6000 lb capacity, have successfully broken a production bottleneck at the Elliott Co.'s Jeannette, Pa., plant, by making possible more orderly flow of production in the machine shop, thereby enabling employes to do better and faster work.

In producing steam and gas turbines, condensers, turbochargers for diesel engines and centrifugal blowers for the Navy and other services, it was found that the system of overhead cranes and column jib cranes company had installed in its 829 ft long machine shop (Fig. 1) and assembly floor were capable of handling an enormous amount of material, but could not be used as the sole means of moving and positioning of material heavier than could be transported by hand trucks.

General use caused overhead crane operations to overlap. Incoming material, too heavy for hand-trucks, had to be moved from receiving department adjacent to assembly floor, on through batteries of boring mills, millers, screw machines and engine lathes, to far end of shop. Work then moved back toward assembly floor located at other end of shop and then into shipping room. Consequently, incoming material often had to be sidetracked while material was moving backwards toward final assembly,

Fig. 2—Combination crane and platform truck are shown carrying assembled generator on skid

Fig. 3—Truck with tote box on skid



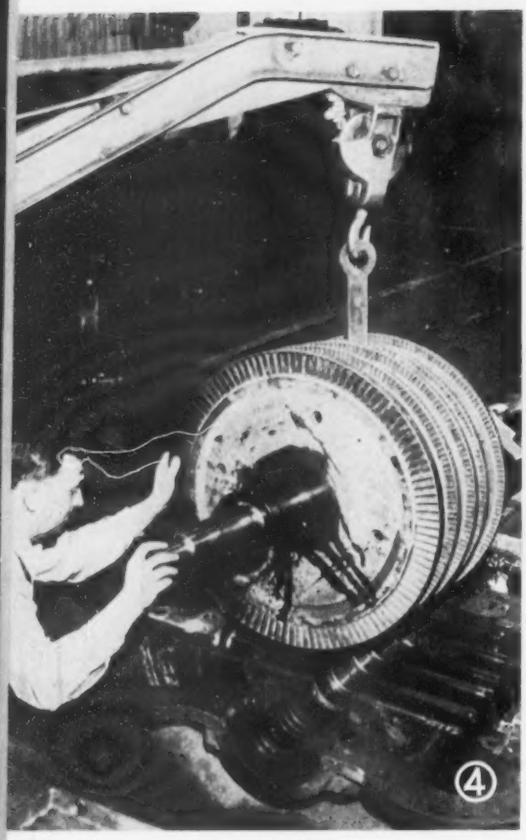


Fig. 4—Crane being used to position rotor blades in assembly of turbine

or until a crane was made available.

The 50-ton crane, heaviest of the three, is located over the assembly floor, its movement confined to this area. Next, or middle crane is of 15-ton capacity, and the far end crane is a 15-ton with a 5-ton auxiliary trolley. Two latter cranes have a run of some 500-odd ft over machine shop area and at times deliver to assembly area.

As heavy material in process was being handled by the 50-ton crane, movement of lighter cranes toward receiving department to pick up material too heavy to be moved by hand-truck was prevented. As this material was to supply machines and operators, down-time often was necessary until the 50-ton crane had been relieved of its task and moved away to permit passage of lighter cranes and their burdens.

As production was important, time could not be spared to rearrange shop's machines. Solution of the problem was found to be two battery-electric platform lift and boom-crane type trucks like the one in Fig. 2. Hand trucking was reduced to a minimum mostly confined to operations not suited for crane handling. The three overhead cranes were freed of moving all but the heaviest loads. Practically all other loads are handled by the truck cranes without interfering with flow of material through shop. Loads up to 7000 lb are moved by trucks working in conjunction with dollies, splitting load weight.

In 1945 a battery-electric truck of similar design and capacity was purchased for foundry use, and work between foundry and flask storage yard located out of doors, some 300 to 400 ft away. A 2000 lb capacity battery-electric platform load carrier has been used since 1920 to carry patterns between pattern shop, pattern storage and foundry.

Average overall length of run of the two 6000 lb capacity battery-electric trucks in machine shop is about 2360 ft. This is not a continuous run, but one that takes in calls to all sections of shop from receiving department, in and out of heat treat, forge shop, tank shop, tool room, test floor, machine departments, casting yard and back to shipping department. Longest, uninterrupted run of the lighter pattern-transport truck is about 640 ft.

Average load carried in the machine shop is between 3000 and 4000 lb. Loads are carried on skids or directly on platform or on crane shown in Fig. 3. Many unit loads of 5000 lb of repetitive items are made up and carried on skids, some of them of special design. Tote boxes of various sizes, waste bins and scrap boxes also are used. Trucks also aid in positioning of machine parts for assembly (Fig. 4).

Battery-electric trucks, at present, are in use approximately 75 per cent of the time of two shifts, or about 12 out of 16 hr. There has been no unscheduled loss of service.

There is a continuous preventive maintenance program for trucks. They are withdrawn from service once a week for greasing, inspection and check-up. Batteries also are cleaned and flushed weekly to insure trouble-free service (the load carrier truck, operating on a relatively light duty cycle, has had only one battery in 21 yr of continuous service). Condition of batteries during use, and before being placed on charge can be observed by truck operator as a Sangamo watt-hour meter is installed on each truck. A pool of five batteries is maintained for the three largest trucks. To replace discharged batteries, trucks are driven to a spot beneath the charging station located on a balcony adjacent to the receiving and inspection department, and batteries are removed by a small crane hoist.

Operation of trucks is the responsibility of the traffic supervisor, who co-ordinates activities on regular runs with special moves required by schedule expediters. Regular runs were developed to cover trips from each end over main traffic lanes. Truck operators were familiarized with the shop operations, location of "hold" areas in certain departments, and sequence of moves required by certain types of operations. Skids and tote boxes are tagged with "Move Orders" to expedite operations.

Under this setup operators largely make their own jobs, varying trips to suit changing production routines. This method is believed to be useful in job-shop routine. In a straight-line production shop, scheduling of trips would be function of centralized control, and timing made more definite. By "taxi-cruising" operators cover more ground and make more moves.

Acquisition of battery-electric trucks for the machine shop was mandatory—first, because any mechanized material mover used there had to be fume- and gas-free, and second, because "spotting" operations involving use of the truck crane on machine beds or in assembling components (Fig. 4) had to be performed within fractions of an inch, smoothly and with precise control of the load.

Stub Machine Drills Now Available

Recognizing the need for a stub screw-machine drill for certain operating conditions, the Chicago-Latrobe Twist Drill Works, 411 West Ontario street, Chicago, is now manufacturing a full line, eliminating the need of cutting down regular drills. Made with short flutes, the drills are heat treated to assure maximum tool life between grinds.

The company says they also can be used to advantage in hand and breast drills. Drills are offered in wire gage from No. 1 to No. 60, letter sizes A to Z, and fractional sizes from 1/16 to 2 in.

Photographic Papers Impregnated With Acetate

True scale copies and reproductions can be produced by the two new photographic printing papers developed by Eastman Kodak Co., Rochester, N. Y. Known as Resisto and Resisto rapid, the base of new papers is impregnated with acetate which is said make it practically waterproof.

Development requires approximately 1 min, fixing 2 min, washing only 4 min, the company claims. Prolonged fixing and washing are not recommended for these papers, but they will not stretch, shrink or swell. Papers are offered in both contact and projection printing types.

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PROBLEMS INVOLVED IN Starting Up AN IRON AND STEEL PLANT

This review is based on an interview with an operating executive of the Carnegie-Illinois Steel Corp., Pittsburgh. While it is not, of necessity, a detailed presentation of the exact procedure followed in any individual plant, it will serve to give a clearer picture of the complexity of the problem and the importance of handling it in an orderly manner

WHEN a company is handling molten metal in lots of 1000 tons or more, shutting down is not merely a matter of pulling a couple of switches, turning a valve or two, and locking the gates. It is a matter of days, not hours, of closely integrated planning, or orderly procedure, all of which must mesh closely to avoid the possibility of serious damage which may delay opening of the plant by as much as a year in some cases. Integrated steel mills, therefore, have given the problem extremely careful consideration.

Assuming that an orderly shutdown is inevitable, regardless of the cause, a plant manager generally would take the following steps to avoid damage to facilities in closing down his plant:

Raw Materials: A three-day supply of certain raw materials is normally either in transit or in cars at the plant; orders are issued three days ahead of the intended shutdown to cease shipments from the mines and quarries. All material in transit, therefore, can be consumed or unloaded before the deadline. Ore, of course, can be stockpiled, but the problem of unloading shipments must be considered, so the supply is tapered off from the ore docks to make sure that all incoming cars will be unloaded. Any loaded cars on hand at close-down time are allowed to stand, subject to demurrage charges, but careful planning acts to hold this item to a minimum. If a boat cannot be unloaded after docking it is tied up until such time as unloading can be done and ore mining operations curtailed accordingly.

Coke: This fuel, being fragile and unsatisfactory to stockpile, is a determining factor in a steel mill shutdown. Beehive ovens are ordinarily drawn at once. By-product coke ovens, however, are operated as close to the end point as is possible to avoid damage to the ovens and to supply the necessary fuel for the orderly termination of mill operations. This process depends in a large measure upon the size of the plant, but arrangements usually are made so that all ovens are free from coke at the end of the second day, thus assuring time to permit all gas lines to be purged and other shutdown activities to be completed. This normally requires from 12 to 18 hr.

Differences in practice will occur ac-

Another case study:

Installed 15 years ago . . .

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A steel furnace is a proving ground where the ability of a refractory to stand up under severe service is truly evident.

So, in one of our periodic field studies, we checked the history of a Round Mill Furnace at one of the country's large steel plants.

We found that in June, 1931, a B&W Refractories engineer was called in to discuss the means of overcoming refractory shrinkage in this furnace's ordinary first-quality firebrick. He recommended and installed B&W 80 Firebrick. Yes, that was 15 years ago—and some of this same brick is *still in service!*

Such unusual performance of B&W 80's is possible, because of these three reasons:

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3. B&W 80's Stand Up Longer—Actual service records prove that B&W 80's have higher hot load strength—stand up longer under heavy loads, even when installed in roofs of furnaces operated as high as 3000°F.

For complete data about B&W 80—the sturdy, dependable, low-cost firebrick—write today for Bulletin R-12-E. Or, if it is more convenient, call in your local B&W Refractories engineer.

R-237

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cording to the need for coke oven gas, either for maintaining the oven heat, or for supplying gas to city mains. Only when natural gas is available in quantity is it possible to empty all the ovens. When it is thought that a shutdown will be of relatively short duration, the charge will be retained in the ovens and the coking process retarded to the maximum possible extent so that the ovens may be kept at heat, thereby minimizing the quantity of natural gas required to maintain a safe oven wall temperature. The importance of keeping by-product coke ovens hot will be appreciated when it is realized that if the silica brick are allowed to fall below approximately 750°F a change in their crystalline structure occurs. This is sufficient to disrupt them and the wall damage may easily be such as to necessitate a complete rebuilding of the oven. This operation, assuming that personnel and materials are readily available, will take at least one year per battery of coke ovens.

If no natural gas is available, from 10 to 15 per cent of the ovens must be kept in operation to supply the gas necessary to keep the balance at a safe temperature. Failure to do this may force the entire mill to remain closed long after the original cause of the shutdown has disappeared, throwing thousands of men out of employment and causing hundreds of thousands of dollars worth of damage. When natural gas is available it is used, the quantity depending upon the size of the plant. In one installation comprising 21 batteries of by-product coke ovens, 15,000,000 cu ft of natural gas are burned each day to maintain an oven temperature of 1000°F.

As soon as an oven has been pushed clean, the doors and openings are luted and sealed as tightly as possible, both to conserve heat and to prevent the entrance of air which might form an explosive mixture. When a battery is closed down all lines leading to the collector line are purged with steam, any gas remaining in the ovens being vented to the atmosphere. This purging is particularly important since as the ovens are pushed one after another the gas in the lines becomes leaner and leaner, thus steadily increasing the possibility of an explosive mixture of gas and air developing. Ordinarily a battery is purged within 14 hr after final pushing of the ovens begins.

Ovens are shut down by groups of batteries at 4-hr intervals, all work being done by day since lines cannot be purged at night because workers cannot distinguish between steam and gas at night, even with artificial light.

Ceasing oven operation likewise means shutting down the by-products refining plant and that is a problem in itself because of the temperatures, pressures and vacuums involved, not to mention the miles of piping that must be purged to avoid serious damage.

Starting up a by-product coke plant requires an even longer time than shutting it down, and until the gas is again available, an integrated steel mill cannot resume operation. Ordinarily, as soon as the date of removing operations is set, work will begin on patching the first group of batteries of ovens, starting work in the morning. Assuming that no serious damage has occurred and that routine patching will be sufficient, charging of the repaired ovens is begun on the morning of the second day. On the third day these batteries are pushed at not over 75 per cent, which serves to reduce the thermal shock to the oven walls. On the fourth day pushing is stepped up to 100 per cent and continued on that basis. Twenty-four to 48 hr after patching has been started on one group of ovens, it is begun on a second group and resumption of operation of that and subsequent groups of batteries progresses on the same schedule as outlined for the first group. If all goes well, it is usually possible to have 20 batteries restored to full operation within eight days. This cycle, however, is predicated upon having the blast furnaces ready to accept coke as it is shipped direct, since it cannot be stored satisfactorily.

Says Wages Can Be High But Should Be Earned

"Reconversion was to have been the big problem after the war. Today, we know we were mistaken—reconversion has been taken in stride—and labor has become industry's most perplexing question," said Jess T. Hopkins, industrial relations director, Summerill Tubing Co., Bridgeport, Montgomery County, Pa., before members of the Pressed Metal Institute at Buffalo recently. "It is a problem in human relations which can be wholly solved only in an atmosphere free from bias and emotion."

Mr. Hopkins pointed out the similarity in state of mind of people in the postwar years following World War I and II. This period is different, however, in that labor unions are stronger politically and financially and business is far more socially minded.

"Business is not so much concerned about high rates of pay as it is that wages, whatever their amount, shall be earned," he said.

Blast Furnaces: Shutting down a blast furnace depends upon several factors such as the coke supply, the amount of metal in the open-hearth or bessemer mixers, the need for hot metal at the steelmaking furnaces, and the estimated length of time that the blast furnace will be idle. When it is estimated that there will be only a two or three day lack of demand for hot metal, the furnace may feed to the pig machine, or possibly be fanned so as to give a minimum of metal. If, however, the shutdown is expected to last from two to four weeks, the furnace will be banked. When a longer shutdown is inevitable, blowing out of the blast furnace is usually justified.

Approximately 12 hr prior to the last cast on the furnace the operator starts charging extra coke. The amount of coke and the manner of charging will vary, depending upon local conditions and operators' preferences and upon how tightly it is possible to seal the furnace. When the furnace has been completely drained of slag and iron the blowpipes and tuyeres will be removed and the furnace sealed. During this latter operation the bleeder will be open and the water and/or plate valve in the gas main closed. This latter procedure is necessary to prevent bleeding of gas from furnaces still in operation and connected to the same gas header. If this step is taken during freezing weather, special precautions must be taken to avoid ice formation. When all furnaces are banked or blown out, water seals can then be drained.

Cooling water must be kept circulating, but may be gradually reduced in volume after about a week. Most operators recommend that a least a 25 per cent water volume be maintained at all times to avoid danger of corrosion developing in drained pipes. By watching the cooling water temperature, conditions can be kept under control. Circulation through the stack cooling plates is the first to be reduced and the process gradually extended down to the hearth jacket. It will be at least three weeks before water circulation can be stopped, and as noted, many operators do not consider that to be a satisfactory practice. It is interesting to note that a blast furnace requires approximately 4 to 5,000,000 gal of water per day, which is substantially as much as is consumed by a city having a population of approximately 50,000.

As in the case of the coke ovens, all gas lines must be purged back to the main line with steam as the furnace goes down. This operation must likewise be performed during daylight to avoid the possibility of accidents. Extra time must

be allowed for shutting down old furnaces not equipped with motor-driven valves and extra precautions taken to avoid, or counteract, any gas leaks. All water lines which are not heated must be blown out with compressed air if a shutdown occurs during winter weather, with particular attention to valves, bends and sumps or low spots.

Putting blast furnaces back into operation depends upon the length of time that they have been shut down. First the stoves must be heated, using whatever form of fuel is most available, principally wood, or in some cases natural gas or fuel oil. Then the pipes are recoupled and, generally, about two of the blowpipes installed. Wind is then restored and increased as conditions warrant after making a careful examination of hearth conditions through tuyere openings. If the furnace has been blown out, the blow-in is in line with standard practice.

As soon as the furnace starts to move routine charging can begin, using almost a normal burden. Exact proportions are, however, a matter for the operator's judgment. Assuming that all goes well, it may be said that it will take one day for every week that the furnace has been banked before satisfactory iron is cast. This in turn will delay adding other furnaces to the line, for the ordinary pig machine only can take care of one or possibly two furnaces. Once the first group of furnaces has been restored to normal operation, which may take from three days to a week, additional furnaces can be blown up as soon as good metal produced by the first group is consumed in subsequent operations.

Open-Hearth Furnaces: As might be expected, in an integrated steel plant the open-hearth furnaces are usually dependent upon coke oven gas for fuel, although in some cases natural gas, oil, or tar may be used to a great or less extent. Shutting down depends upon the amount of fuel available, the amount of hot metal that must be processed, and the personnel available. Ordinarily, charging is stopped at least 18 hr before the time when the plant is scheduled to be shut down to allow time for tapping, pouring and making proper disposition of the metal. Every effort must be made to get the metal out of a furnace before the fuel supply is cut off to prevent either bottom damage or freezing of the metal, which would involve a tremendous amount of work to salvage. This is likewise the case for hot metal mixers. Their contents may be run over the pig machine if the furnaces cannot use the metal, or in an emergency the metal can be cast or even wasted. Normally, if gas fuel is available the furnace is kept warm to protect the brickwork, particularly the silica brick roof. As soon as the last heat has been tapped from the furnace, the furnace is sealed and the dampers closed to conserve heat. Sealing is made as tight as possible and the furnace allowed to cool slowly. Ordinarily a furnace is kept sealed for 11 to 14 days before being opened for inspection. Cooling water is kept circulating in doors, door frames, skewbacks, etc. for at least a week after an open-hearth furnace has been shut down.

Since the normal life of an open-hearth furnace roof is only approximately six months, those furnaces which had been in operation more than four months will have rather thin roofs. It may, therefore, be expected that those roofs, being structurally weak because of normal erosion, will fail when the furnace is allowed to cool. These roofs, therefore, must be replaced before the furnaces can be again put into operation after the shut down period.

When starting up an open-hearth furnace, at least 24 hr are required to warm it up, assuming that no damage has occurred or that any damage has been repaired. A long shutdown, however, may mean that rather extensive repair work will be necessary before heat can be applied. With ample fuel available, it is possible to turn out a heat in 18 hr after good quality hot metal becomes available.

Bessemer Converters: These vessels are the easiest of all steelmaking equipment to shut down, and consequently, are the last to be taken off the line. If not required to process steel, they can be used to process hot metal for synthetic scrap as a supplement to pig machine capacity. As a result, they usually are kept in operation until as close as 12 hr to the deadline, at which time they are shut off and their hydraulic equipment drained if an extended shutdown is anticipated.

Mill Furnaces: Soaking pits and reheating furnaces ordinarily are allowed to cool down at once when the fuel supply is cut off. Unless they are being used for heating critical grades of steel they can be operated up to the deadline imposed by the necessity for clearing rolling mills and disassembling the hydraulic equipment should the shutdown occur in cold weather. It is important, however, that no heat treating operation be undertaken that cannot be completed before the deadline. All "hard" steel must be rolled and under cover before loss of fuel. Pickling and cold reduction lines are shut down early enough to assure that all stock can be either completely annealed or placed under annealing hoods prior to the deadline since unannealed stock held in process inventory would be seriously damaged by rusting.

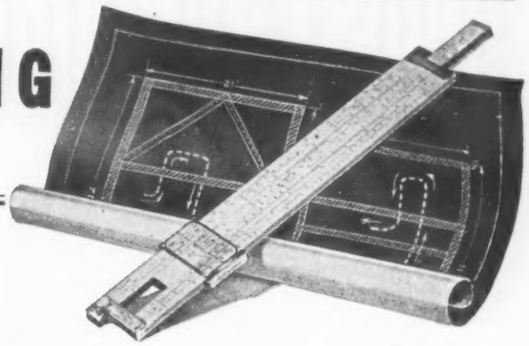
Rolling Mills: It is not too difficult to suspend rolling mill operations under normal conditions since they depend primarily upon a supply of heated steel and are governed by furnace conditions already mentioned. If, however, the shutdown occurs during cold weather, all hydraulic lines, accessories and valves must be completely freed of water by blowing them out with compressed air. Individually operated valves under mills and tables must in some cases be disassembled, and if that is not possible, operated by hand at frequent intervals (in some cases every 15 min) during the shutdown to prevent freezing and serious damage which might prove extremely difficult to repair when the time comes to start the mill again.

Steam Lines: In the interest of fuel and labor economy, everything possible is shut off to avoid leaks and excessive radiation. Wherever possible, joints are broken to avoid trouble from contraction when a relatively long shutdown is anticipated. Traps and low spots are blown free and drained. All lines not disconnected are kept warm and are inspected at frequent intervals to assure

(*Please turn to Page* 180)

PRESSURE-SEALED GASKET: Pressure to be sealed exerts a corresponding sealing pressure on flange faces of this serrated Bellow-seal gasket, developed by Goetze Gasket & Packing Co. Inc., New Brunswick, N. J. It consists of two disks of metal external faces of which are machined with serrations and welded together around the outer periphery. Line pressure entering gasket interior exerts expansion pressure in excess of required sealing force

OVEN ENGINEERING NEWS



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The Industrial Oven Engineering Company believes that production can reach its maximum only when the safety of personnel and equipment parallels in importance, any production objective.

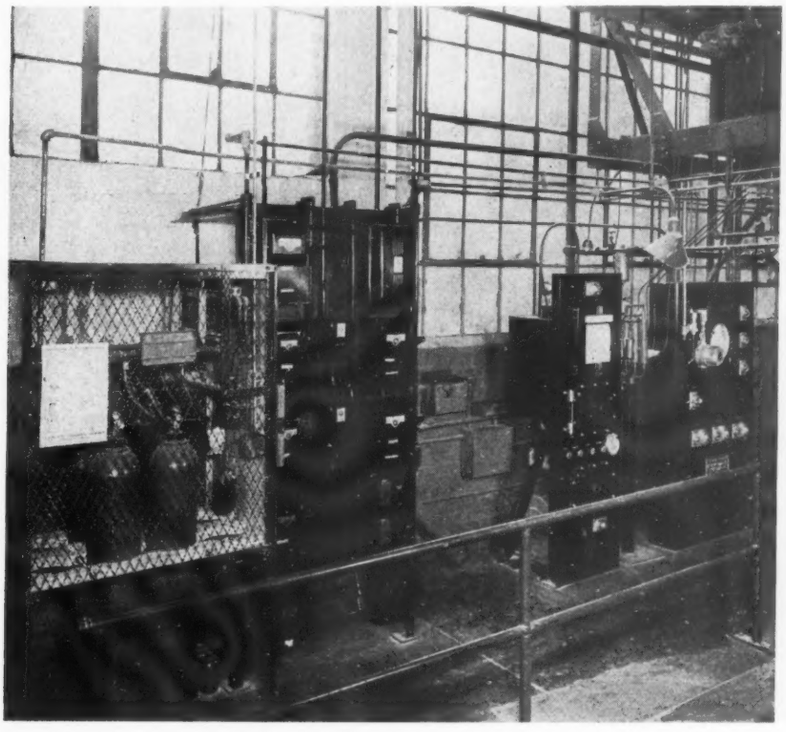
Here is an illustration of a four-panel group of safety devices. Although the illustration covers a coated fabric system, the same basic engineering considerations are typical of all **IOE** explosive installations. Here's how they work; here's how they protect men and machines.

Starting from your left, the first wire cage panel is a Carbon Dioxide fire control unit in case of a quick temperature increase, which produces a sudden discharge of CO_2 into the enclosed oven volume work space, and along the paths of material travel.

The equipment consists of fully automatic, heat-actuated releases positioned in strategic locations in the dryer equipment. Fire is almost immediately smothered out before it has a chance to do damage.

Panel No. 2, second to the right, is an AC service panel. On this panel are all the motor controls, disconnecting switches, voltage protectors, and other equipment essential to the control of the electric power system.

Panel No. 3 is a "tattletale" unit giving visible, continuous, record of the concentrations of the explosive mixtures and vapors at multiple points throughout the drying system. Explosive gas samples are thermally appraised for explosive content, and the results are continuously recorded for absolute operational evidence. The continuous analyzer—as this unit is called—is interlocked into the system and is equipped with audible and visible danger enunciators.



Panel No. 4, last in line to the right, is the explosion-proof temperature and main operating panel; combining all the operating stations necessary to give single station operating control to the unit. It consists essentially of recording temperature control at several places throughout the drying oven. In addition to this multi-point control, panel-type enunciator lights give visible notification of the operating condition of the unit. Push-button control of all motors, valves, accuators, and relays, incidental to the system's safe operation are incorporated in this board.

Yes, safety is essential. Without it production lags. All Industrial Oven Engineering installations are designed to eliminate the hazards of explosion and mechanical failure.

WE MAKE: Cord Coating, and Cable Lacquering Systems • Complete Fabric Cementing Systems • Continuous Takeup and Payoff Stands • Dip Tanks • Drying Ovens • Creel Rooms • Constant Speed, Constant Tension, Extrusion Takeup Machines for Plastic Resin Hose, and Coated Cords • Rubber Tubing, V-Belt Cord and other continuous Materials

Write for "Blueprint for Industry—Part III" gives full engineering information on the **IOE** *constant-speed, constant-tension windup machine for all continuous materials. FREE.*

(This is Number 26 of a series. Reprints of previous advertisements sent on request.)

IOE ENGINEERING VERSATILITY

THE INDUSTRIAL *Oven Engineering* COMPANY

13825 TRISKETT ROAD, CLEVELAND 11, OHIO

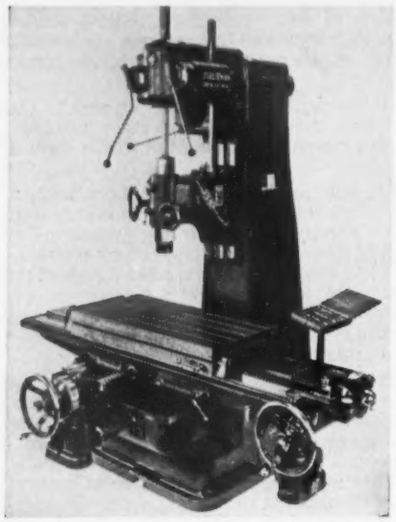
★ ASSOCIATED COMPANY: JAMES DAY MACHINERY LTD., LONDON, W. 1, ENGLAND ★

INDUSTRIAL EQUIPMENT

Jig Borer

Cleereman Machine Tool Co., Green Bay, Wis., associated with Bryant Machinery & Engineering Co., Chicago, is announcing a new master model 1836 jig borer in which is incorporated many new features.

A spindle-quill of heat-treated nitralloy provides a hard, good wearing sur-



face. All important castings are of strong, close-grained Meehanite. Rapid traverse is by vertically mounted motor driving an electrical plugging switch for braking purposes. Table clamp and longitudinal end measure trough are an integral unit mounted on front of saddle ways for accessibility and convenience.

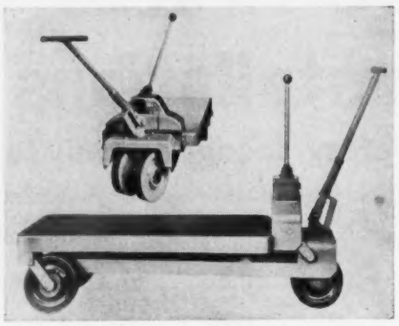
The machine table is 5½ in. thick, preventing any tendency to distort when clamping. Length of ways for table is 81 in. and length of center guide on base is 40 in. Machine is completely enclosed for protection of operator. All controls are placed on front of machine in a time-saving grouping.

Steel 5/6/46; *Item No.* 9262

Lifting Truck

A new modernized Load-lift materials handling truck which utilizes the hydraulic principle in lifting is announced by Market Forge Co., Everett, Mass. Its feature is the safety factor incorporated by divorcing lifting handle from lifting mechanism, eliminating possibility of accidents while hydraulic mechanism is sealed from foreign matter.

Added feature of the lifting mechanism is that each stroke is a power stroke, with truck platform remaining stationary



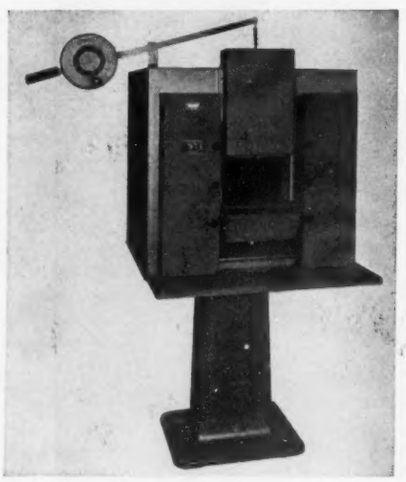
at any height. To prevent injury to the truck, the makers have also included a 20 per cent overload safety valve.

Truck, offered in capacities of 3000 and 5000 lb, is equipped with sealed and permanently lubricated ball bearings in its wheels.

Steel 5/6/46; *Item No.* 9191

Hardening Furnace

Tools up to 5 x 7 x 14 in. maximum size can be hardened free from scale and decarburization in the new and larger size steel hardening furnace now offered



by Sentry Co., Foxboro, Mass. The model, known as No. 5, has a muffle chamber 7 in. high, 8 ⅞ in. wide, and 20 in. deep.

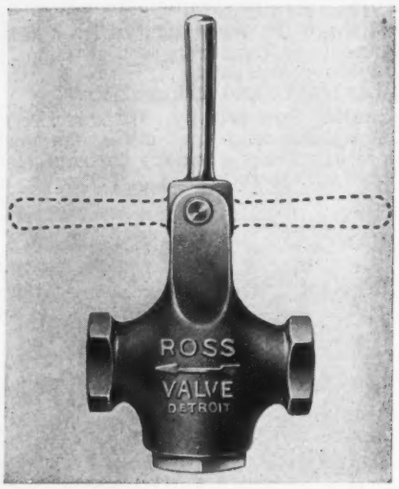
Innovations in design include location of air-cooled heating elements from front to rear alongside the removable muffle chamber, and a furnace heating chamber which reflects heat toward the muffle chamber opening to offset tendency to cool at this point. Terminals and electrical connections are shielded by removable metal guards.

The furnace is rated at 42 kw maximum. It can be connected directly to 220 v, 3-phase supply without a transformer. Mounted on a cast-iron pedestal, its overall dimensions are 36 in. wide, 48 in. deep and 68 in. high with the hearth 46 in. above the floor.

Steel 5/6/46; *Item No.* 9179

Shut-Off Valve

A non-corrosive shut-off valve, designed for use in air, gas and low pressure liquid lines, is announced by Ross Operating Valve Co., 6474 Epworth boulevard, Detroit. Features of the valve include few operating parts, self-locking



handle in either open or closed position, full flow, and positive shut-off. Position of shut-off lever acts as a visual indicator to check whether valve is open or closed. Valves are offered in sizes of ¼, ⅜, ½, and ¾-in. sizes.

Steel 5/6/46; *Item No.* 9189

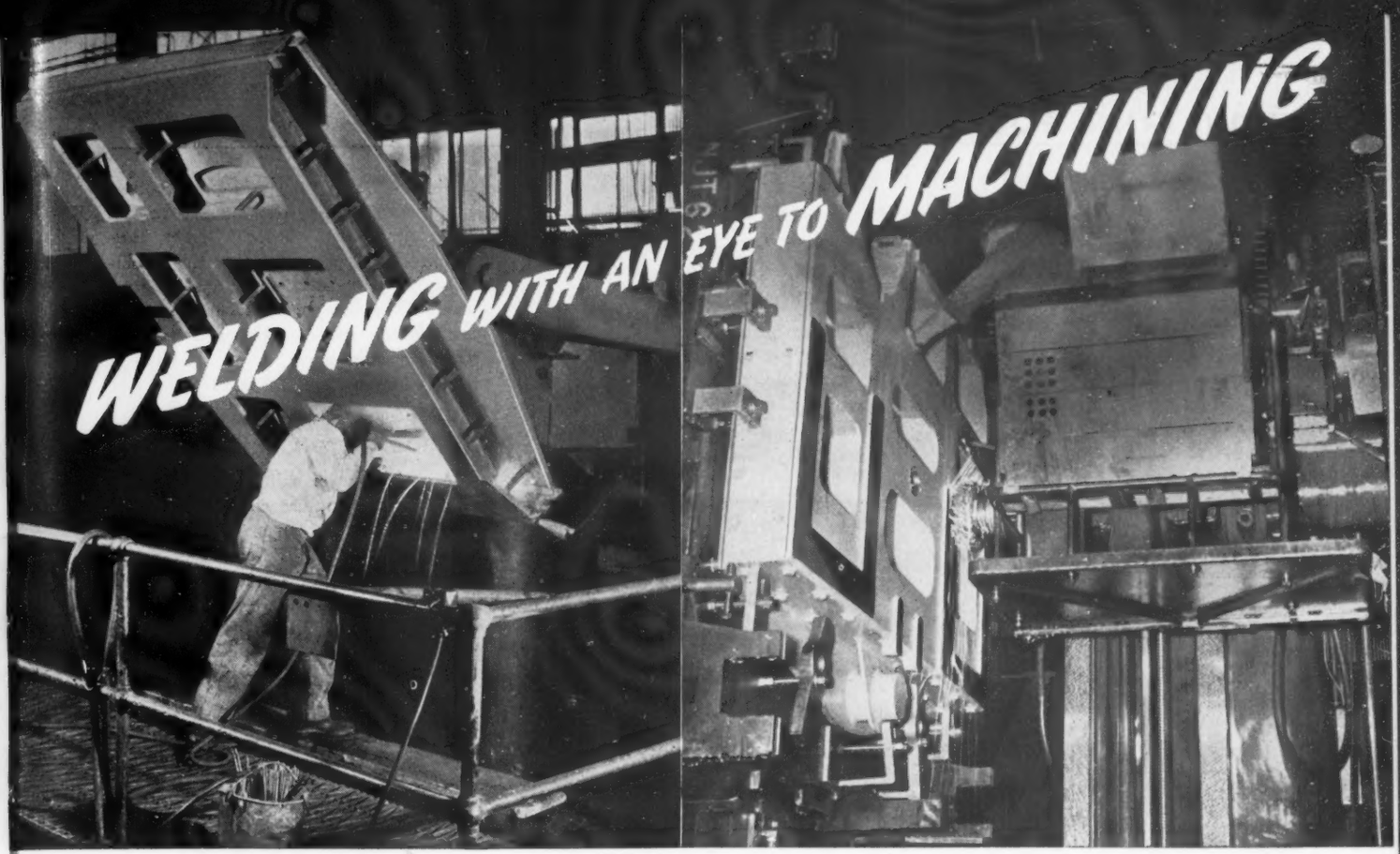
Crane Cab Cooling Unit

A new self-contained air-cooled conditioning unit for crane cabs working over ingot molds, soaking pits, or vats where acid or other fumes are present is announced by Dravo Corp, machinery division, 300 Penn avenue, Pittsburgh.

The unit, which is fitted to the top of the cab, requires only an electric power connection for operation. The air supplied to the cab is cooled, cleaned and constantly circulated. Dust and smoke are dissipated and acid fumes are eliminated by a fume absorber.

Maintenance consists of the occasional changing of filters of the standard throwaway type used in steel mill operations.

(All claims are those of respective manufacturers; for additional information fill in and return the coupon on page 174.)



Mass Production of Machined Weldments

at Lower Final Cost

Position welding sped the above base to the machining stage because position welding is down-hand welding—faster because push button control brings the weldment to any desired angle—lessens handling and propping.

Revolving horizontal and vertical tables—standard and right-angle heads on the horizontal boring mill above makes possible innumerable combinations of milling, facing, turning, and boring, and multi-surface machining without change of setup. These extensive facilities at the Danly plant plus the "know how" are speeding reconversion with mass production of large units.

DANLY MACHINE SPECIALTIES, INC.
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Three factors vital in cutting costs of manufacture of large structures are grouped here:

1 ***Known quality of welding.*** Flaw-free welding to close tolerances makes for effective reductions in the cost of machining. Rough cuts are fewer or may be eliminated entirely.

2 ***The job should be of volume quantity.*** Repetition makes for greater efficiency, and tooling costs lower as they are spread over volume production.

3 ***Facilities must be adequate to handle the job.*** In Danly's modern plant are the welding facilities, machine tools, normalizing furnaces, shot blast equipment, handling equipment, X-ray, Magnaflux, and complete inspection facilities for producing and delivering your job to any desired specifications at lower *final cost.*

Avail yourself of Danly's efficient production program and fast delivery service. Call, write or send in your blueprints.

DANLYWELD

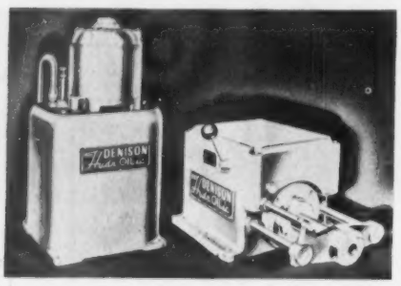
Welded and Machined at Lower Final Cost

The unit itself has been designed to withstand the vibration inherent to heavy duty crane operation.
Steel 5/6/46; *Item No.* 9218

Hydraulic Power Units

Denison Engineering Co., Columbus, O., announces multi-unit HydrOILic power, a group of packaged hydraulic press components in compact, unit form. Fully standardized, they offer a ready, economical means of installing 4 and 6-ton oil-hydraulic pressure in equipment designed to meet unusual or specific manufacturing needs.

These components include compact, easily moved pumping units in two models, and power heads in five models all

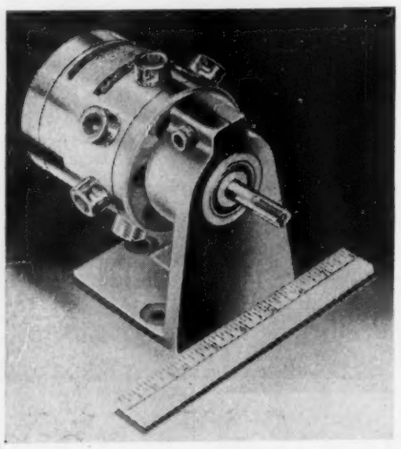


designed for convenient mounting upon machinery in positions best utilized.

The pumping unit incorporates electric motor, hydraulic pump, pressure regulating valve, reservoir for the hydraulic fluid and oil level gage. The power head incorporates hydraulic cylinder and ram, hydraulic control valve, control lever, and ram action control devices all fully enclosed. The five models offer throttle-type control of ram movement, rapid ram traverse and regulative approach speed, automatically repeated, short uniform-pressure strokes, automatic ram cycling, and a combination of practically all features of each other model.
Steel 5/6/46; *Item No.* 9140

Hydraulic Pump

Utilizing principle of inherent sealing by fluid pressure, a hollow piston to generate fluid compression is incorporated into the design of new Seco hydraulic pumps manufactured by Simplex Engineering Co., Zanesville, O. The piston



used is of tool steel, heat treated to give strength, elasticity and good wearing qualities.

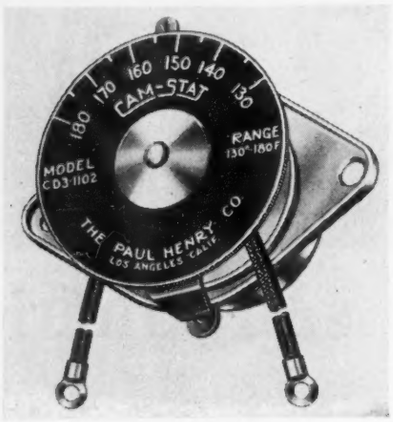
The mechanism for conveying oil to and from hollow piston, the pressure generating point, consists of seven piston and sleeve assemblies, equally spaced radially, driven by an eccentric shaft.

The pumps are not self-priming. They are for installation below the oil reservoir supply where gravity will automatically keep them primed, and will maintain a vacuum of 25 in. of mercury with an air tight line. As they can be run in either direction, there is no opportunity of installation being in wrong direction.

Displacement is constant per revolution, but volume discharge under pressure is closely proportional to the revolutions per minute. The pumps may be used for variable displacement by driving from prime mover through a variable speed transmission.
Steel 5/6/46; *Item No.* 9033

Temperature Control

A new line of adjustable calibrated Cam-Stat temperature controls for water heaters and other uses, announced by Paul Henry Co., 2037 South La Cienga, Los Angeles, provide precise dial selec-



tion of the temperature control point with uniformity of dial accuracy.

Controls feature tamper-proof dials preventing changing of adjustable range provided at factory. A choice of adjustable ranges between minus 50° and plus 600°F., with differentials as low as 1°F. are offered. Controls may be clamped on the tank or immersed in water.

Operation is by double break snap ac-

FOR MORE INFORMATION on the new products and equipment mentioned in this section, fill in this form and return to us. It will receive prompt attention.

Circle numbers below corresponding to those of items in which you are interested:

9262	9218	9153
9191	9140	9091
9179	9033	9200
9189	9190	
	5-6-46	

NAME ..... TITLE .....

COMPANY .....

PRODUCTS MADE .....

STREET .....

CITY and ZONE ..... STATE .....

Mail to: STEEL, Engineering Dept.—1213 West Third St., Cleveland 13, Ohio

(All claims are those of respective manufacturers; for additional information fill in and return the coupon on this page.)

1. Something's wrong if you ask your REPRODUCTION DEPARTMENT (in the nicest possible way) to rush a print of a sales report or office form . . . and you're told it takes at least 10 MINUTES to make one print.

(And this is only the time for a negative copy of your original; a positive takes twice as long.)

If this happens to you, something's wrong with your reports and forms—just ask any Draftsman.

2. Draftsmen get prints in a fraction of this time . . . because they *always* draw on translucent paper which can be reproduced in an Ozalid machine, or in blueprint or other equipment.

If office forms and reports are on opaque paper, they cannot be reproduced in this economical manner. They must be copied photographically . . . and, by comparison with OZALID, which employs unique Dry-Development, this takes at least 65 times as long. (OZALID PRINTMASTER TURNS OUT PRINTS IN AS LITTLE AS 9 SECONDS.)

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There's an Ozalid print for every job!

Adopt translucent forms, reports, application sheets, etc., so that all departments can utilize OZALID—the same as Engineering.

Even continuous-tone photographic subjects can be reproduced in seconds—at a negligible cost—if a positive film MASTER is made from the negative.

P.S. If you haven't an OZALID MACHINE as yet, WRITE FOR FREE BOOKLET 92 telling the complete story, and containing samples of 10 types of OZALID prints.

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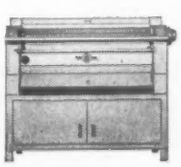

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DIVISION OF GENERAL ANILINE AND FILM CORPORATION
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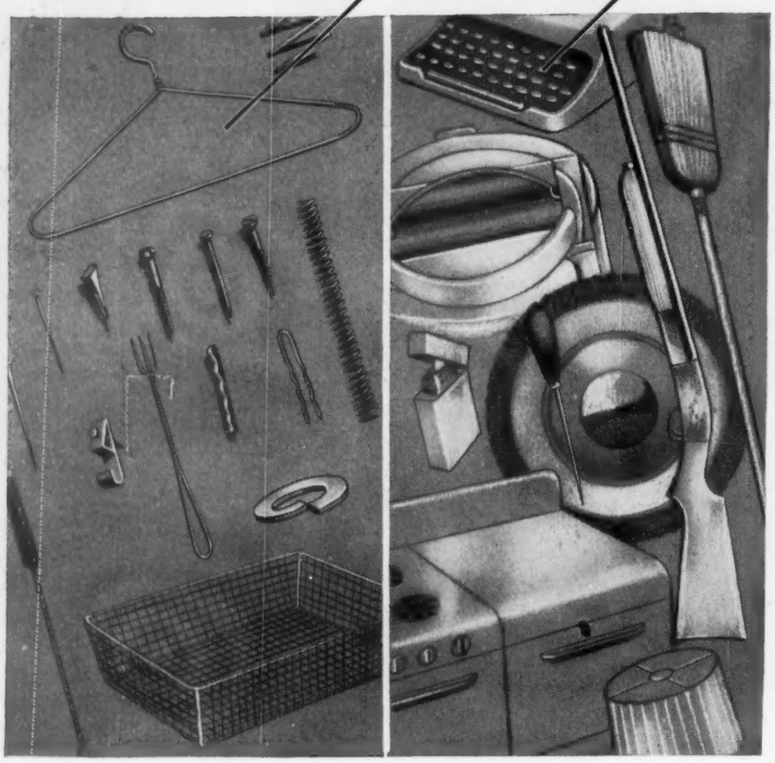

Page offers you a single responsible source for round, flat or shaped wire — of low carbon, high carbon, stainless or special alloy steel or Armco iron. Also a complete range of welding electrodes and gas rods, with emphasis on stainless steel. For wire or information about the best use of wire, get in touch with PAGE.

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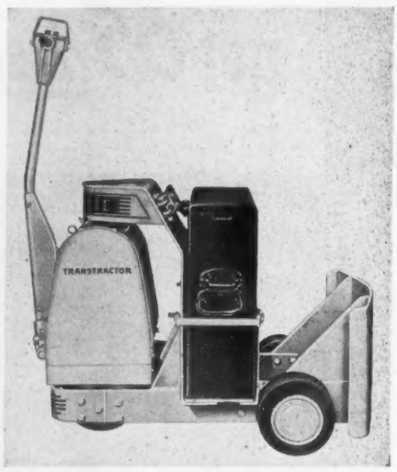
AMERICAN CHAIN & CABLE

tion contacts with a rating of 12 amp, 115 v ac or 28 v dc.
Steel 5/6/46; *Item No.* 9190

Electric Hand Tractor

The Transtractor, a new electric-propelled hand tractor developed by Automatic Transportation Co., Chicago, division of Yale & Towne Mfg. Co., combines features of a hand truck and a ware-



house tractor. Designed for close quarter operation, it has a front-wheel drive and is guided and controlled by a handle.

Able to push or pull a 6000 lb trailer load constantly or up to 20,000 lb intermittently, the tractor has two speeds forward and reverse. Its braking system is actuated by moving the control to an erect position.
Steel 5/6/46; *Item No.* 9153

Dryers

Designated as Gasflux 636 series dryer, a new dryer for removing moisture from air and gas lines is announced by Gasflux Co., Mansfield, O. This equipment is suitable for use in connection with welding and brazing operations where moisture conditions are causing difficulties.

Construction of the dryer is an outer shell of 6-in. OD seamless steel tubing and a removable inner shell or cartridge of rolled sheet metal having a perforated metal bottom. A cast bronze head with inlet and outlet openings is bolted to a flange welded to the outer shell. Incoming gas or air must first pass downward between the inner and outer shell, thus trapping out entrained moisture, and then passes upward through the drying medium the full length of the cartridge in order to reach the outlet valve.

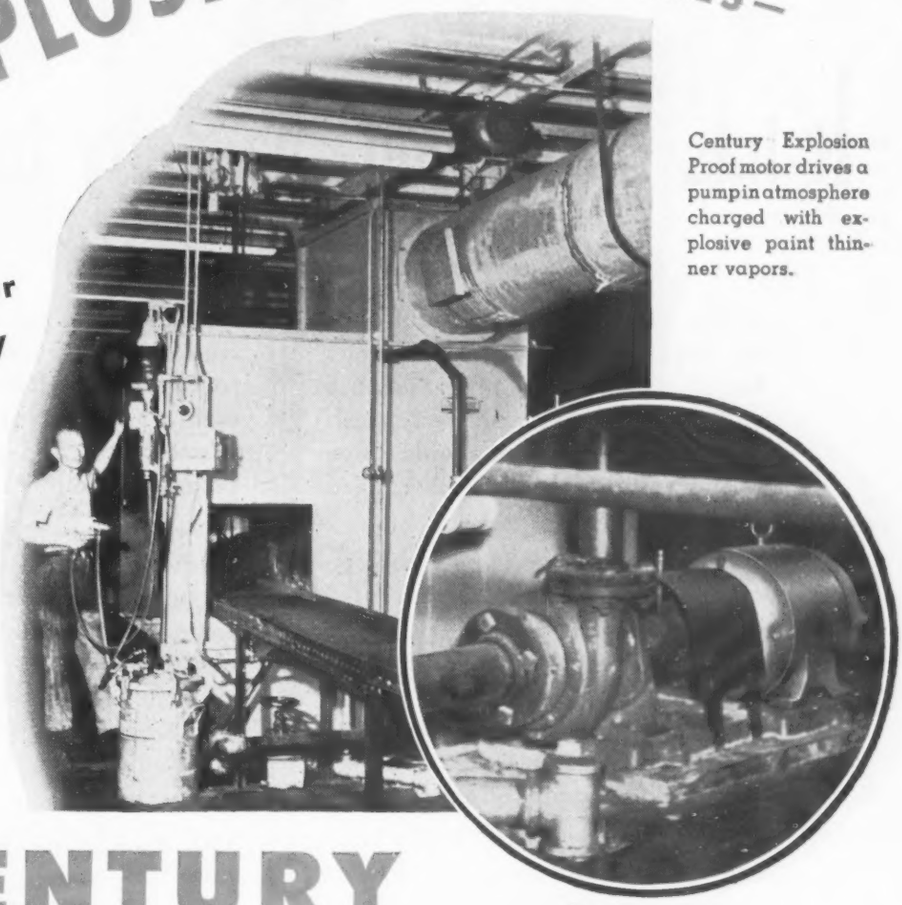
Depending upon the drying efficiency that is required there is a choice of three drying media to be used in the cartridge. These are:

Fiberglass, which acts as a superior

IN EXPLOSIVE ATMOSPHERES—

PROTECT Your People From Injury

PROTECT Your Plant From Costly Shutdowns



Century Explosion Proof motor drives a pump in atmosphere charged with explosive paint thinner vapors.

with CENTURY EXPLOSION PROOF MOTORS

Where atmospheres are charged with such explosive mixtures as alcohols, acetone, solvent vapors, natural gas, gasoline, naphtha, grain dusts, etc., Century Explosion Proof motors will give you maximum protection against explosions and fire.

Century Explosion Proof motors are built to meet all standard operating characteristics — high torque, low torque, normal torque, multispeed. The inner frame of these motors is enclosed so that mechanical operating parts and electrical connections are completely sealed from the outside atmosphere.

A blast of cooling air is forced by large ventilating fan between the inner and outer frames. This keeps the operating temperature down and blows dust and dirt out.

Engineered to the functional characteristics of the machines they drive to assure top performance — Century motors are a vital factor in building a better product at a lower cost. Specify Century motors on all your electrically powered equipment. Built in sizes from 1/20 to 600 horsepower.

Century C MOTORS 468

CENTURY ELECTRIC COMPANY 1806 Pine Street, St. Louis 3, Missouri

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It has tremendous capacity for its size!

Where there's a need for high unit capacity, Torrington Needle Bearings furnish the answer to a great number of design problems... one reason also why they serve in such a wide range of applications in so many diversified industries.

Behind this outstanding advantage of tremendous radial load capacity for their size lies the principle of needle bearing design: the full complement of small diameter precision rollers which provides many linear inches of bearing contact surface... assures load distribution and minimizes wear.

There are many other Needle Bearing features important to you as designer, manufacturer or user of mechanical equipment... ease of operation under severe conditions... ability to retain and distribute lubricant evenly over bearing surfaces... low initial cost... and unit construction permitting simple, rapid installation.

If you are not fully acquainted with all the advantages which make Torrington Needle Bearings applicable to *your* product, write for our informative Catalog 32... or for prompt assistance on immediate friction problems confronting you, consult our engineering staff.

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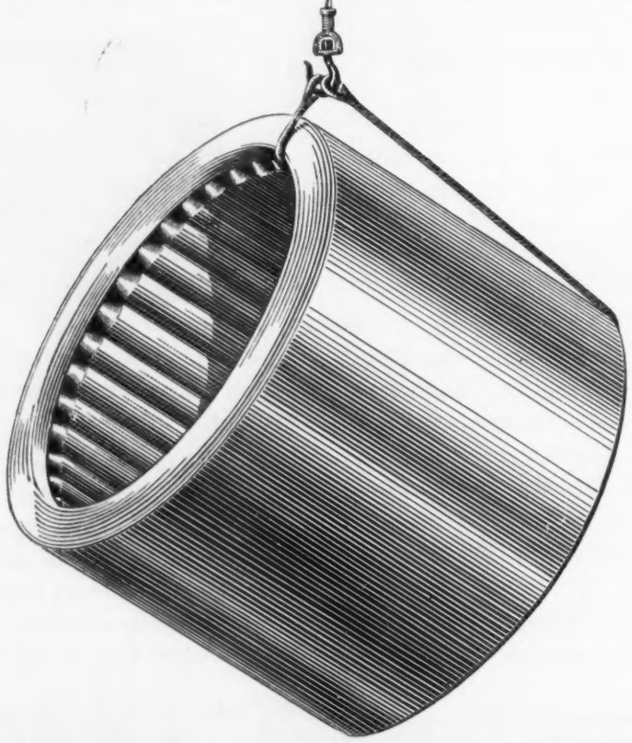
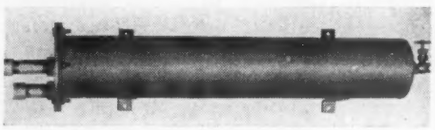


TORRINGTON NEEDLE BEARINGS

baffle and is nonabsorbent. Its action is mechanical. All entrained moisture will be removed, but not all of the water vapor.

Calcium chloride, which absorbs 90 per cent of its own weight in moisture. It will remove water vapor to the extent



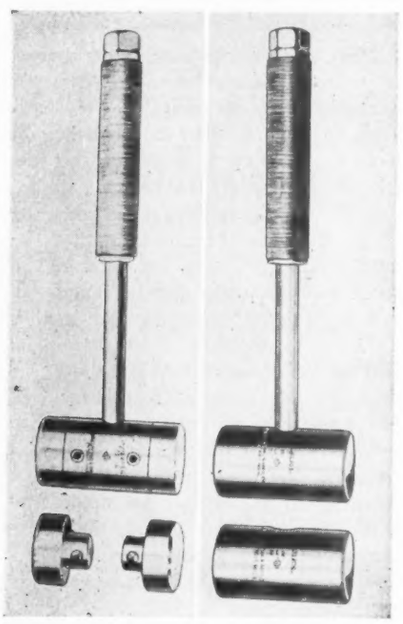
required for most uses of air and gas.

Activated alumina, which absorbs only 12 to 14 per cent of its weight in water vapor. It is recommended where absolutely dry gas or air, entirely free of water vapor, is required. After being used to capacity, the cartridge can be reactivated by heating.

Steel 5/6/46; *Item No.* 9091

Soft Hammers

Two new soft hammers in the light sledge weight range, designed for use in locomotive shops and for the assembly of heavy machinery in tool and die shops, have been announced by the Gregory Tool Mfg. Co., 5300 Tireman, Detroit,



one having a replaceable copper or brass head and the other replaceable brass or copper tips.

Each type is available with head diameter sizes of 1¾, 2, 2¼ and 2½-in. and weighing from 4½ to 10½ lb. All are equipped with a leather washer handle for perfect balance. The removable steel head is case hardened.

Steel 5/6/46; *Item No.* 9200

TRIPLEX

for Toughness!

CAP SCREWS IN ALL SIZES

Tensile strength and toughness are the things that count today in cap screws. Why accept anything less than TRIPLEX quality when you can now get these Cap Screws in all diameters up to 1″ and various lengths up to 8″. Available in Flat, Fillister, Button and Hex Heads.

Write for free wall chart. It will save you hours of time in making out purchase orders.

THE TRIPLEX SCREW COMPANY

5341 GRANT AVENUE • CLEVELAND 5, OHIO

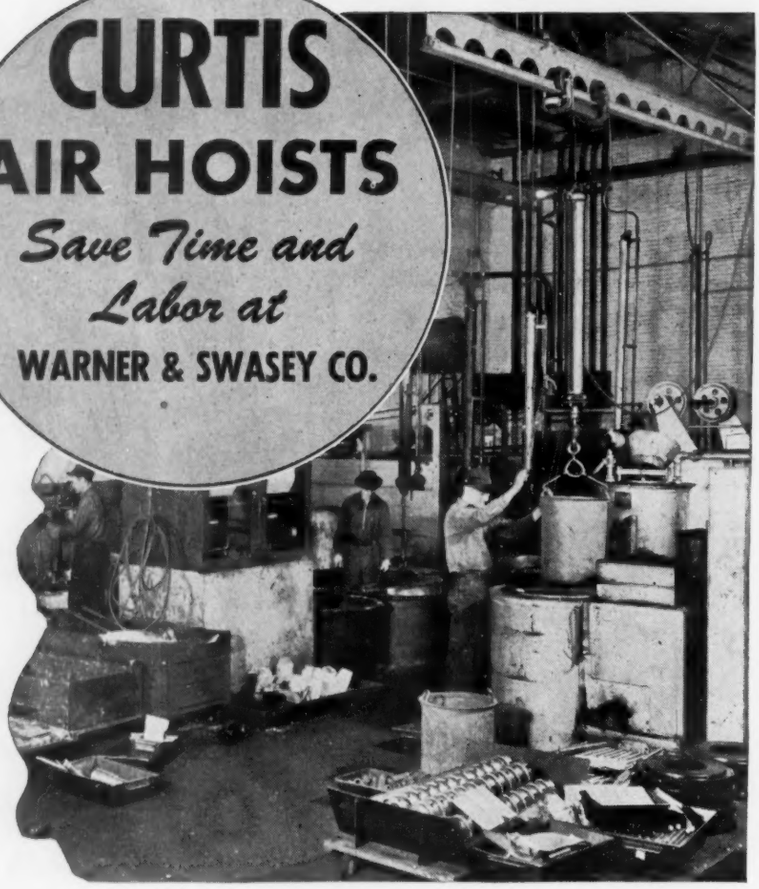
TRIPLEX THREADED FASTENERS

CAP AND SET SCREWS • BOLTS, NUTS AND RIVETS

CURTIS AIR HOISTS

Save Time and Labor at

WARNER & SWASEY CO.



Curtis Air Hoist used in operating the Cleveland Tramrail System in the heat-treating department of Warner & Swasey Co., Cleveland.

It's another example of a well-known company relying on Curtis air-operated equipment to speed production, save time and labor, too. Curtis Air Hoists offer the following advantages to any company concerned with any lifting, pushing or pulling operation:

- **Low first cost — lowest operating expense.**
- **Smooth, fast, accurate control of load.**
- **One-man or one-woman operated.**
- **Finger-tip control.**
- **Light weight — pendant, bracketed or rope-compounded types.**
- **Cannot be overloaded.**
- **Capacities up to 10 tons.**

Find out how Curtis Air Hoists, Air Cylinders and Air Compressors can save man hours, cut costs in your plant. Write for Bulletin C-7.

92 Years of Successful Manufacturing

CURTIS PNEUMATIC MACHINERY DIVISION
of Curtis Manufacturing Company
1996 Kienlen Avenue, St. Louis 20, Missouri

Please send me Form C-7 on Curtis Air Hoists and Air Cylinders; also Curtis Air Compressors.

Name.....
Firm.....
Street.....
H-490 City.....Zone.....State.....

Starting Up a Steel Plant

(*Concluded from Page* 170)

proper operation of the traps to bleed off any condensate.

Lights and Power: Even when a big mill is completely shut down, from 15 to 20 per cent of the normal electric power load is necessary to assure minimum maintenance and essential physical protection of the property. Certain unit heaters, water pumps, gas reversing valves, and boiler house auxiliaries must be kept in operation and current supplied for protective lighting as well as for pumps to provide emergency water supplies necessary for protection against fire.

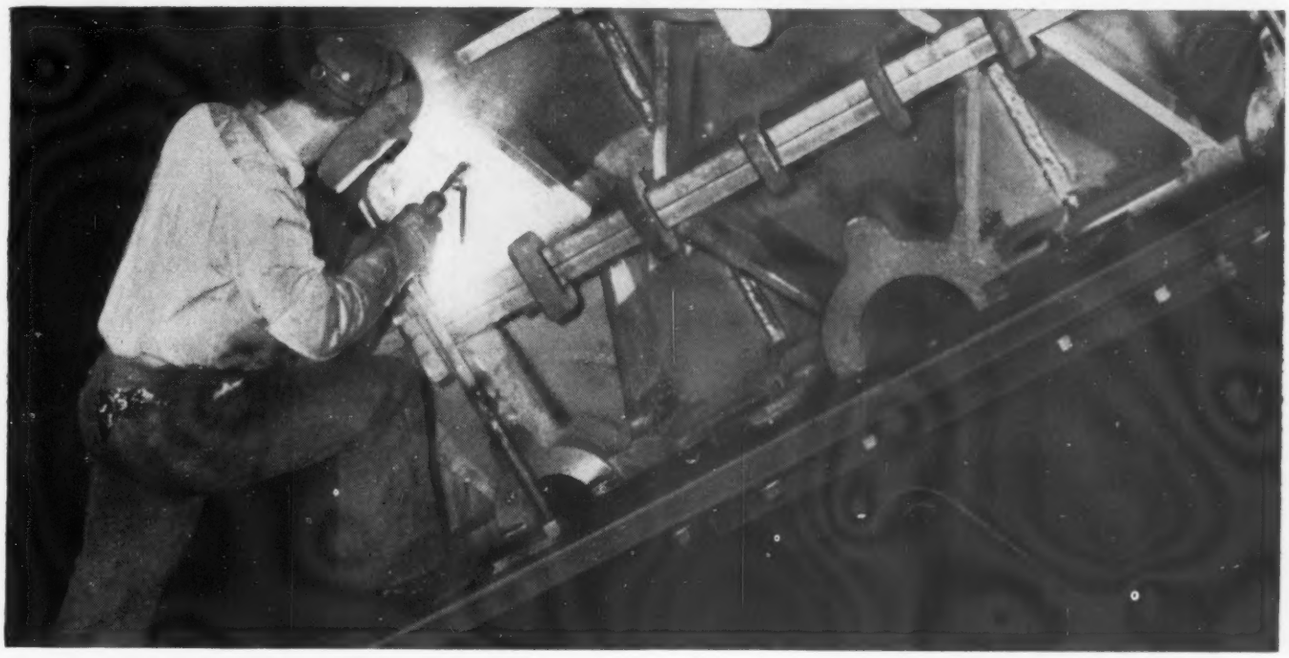
Restoring Operations: As soon as possible all equipment should be inspected to determine the amount and character of damage that has occurred as a result of a shutdown. This, of course, varies with the plants, the most serious situation usually being where the cooling cycle has been too rapid for the brickwork involved. Coke ovens must ordinarily be started first, then the blast furnaces, and then the open hearths. Soaking pits can be heating while the open-hearth furnaces are being warmed up and mill furnaces can be started as soon as a sufficient supply of gas and steel becomes available for production purposes.

When the shutdown has been caused by a flood, the shutdown procedure for individual units as indicated previously holds in general, but the sequence of such a shutdown is controlled by the relative elevation of the various units involved. Units may have to be taken out of operation for various reasons. The units themselves may be flooded, the tracks servicing them may be inundated and in some cases a minor amount of water, as for example in the bottom of soaking pit flues, may necessitate the complete shutdown of a primary mill and subsequent operating units supplied by this mill. Open hearths and blast furnaces may have to be shut down if there is no outlet for the product of these units, even though they themselves are not directly affected by the flood. When restoring service any electrical equipment which has been wet must be thoroughly cleaned and dried, and all lubricating lines, bearings, etc. must be cleaned out and refilled with fresh lubricant.

Seldom indeed can a large mill be put back into normal operation in less than two to three weeks when an extended shutdown has been involved, assuming, of course, that no serious damage to the equipment has occurred during that time.

MUREX FHP

"Hot" Electrodes



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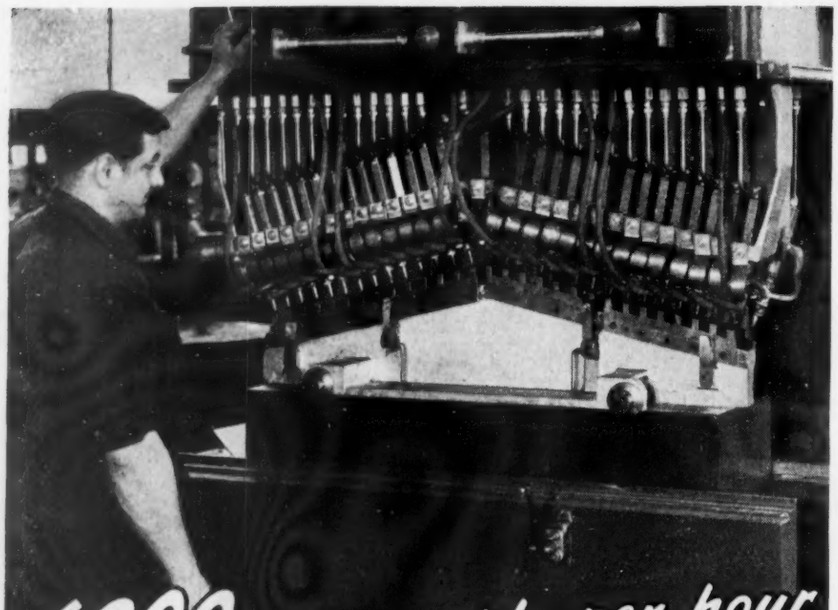

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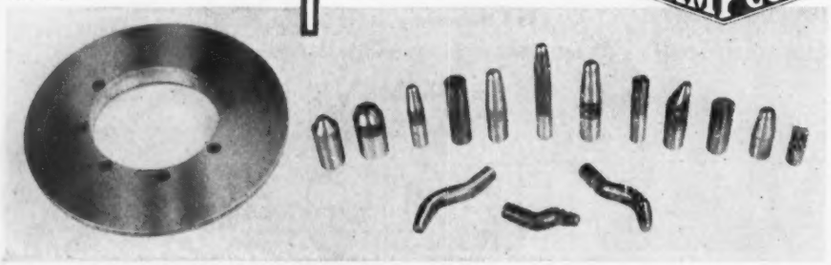

Experimental Gas Turbine

(*Continued from Page* 136)

as well as under full load conditions.

Many design modifications were necessary because of the nature of the new alloys used in gas turbine work. One such modification was cooling of high-temperature disks at the high pressure ends of the turbines.

High temperature piping of the unit is designed with an inner skin or gas conducting member over the walls of which there is no pressure difference. Mineral block insulation between the inner and outer wall establishes the temperature drop whereby the outer wall is cooled to maintain physical strength.

A further objective of the test was the determination of the operating characteristics of a gas-turbine unit applied to marine propulsion. Main compromise in arrangements that was made in consideration of the ultimate marine application was separation of power turbine from the gas-generator turbine, and the arrangement of the two turbine elements in parallel.

Thermal Efficiency Not Considered

Being an entirely experimental gas-turbine unit, thermal efficiency was not given first consideration in its design, although it was recognized that the ability to operate at higher temperatures would improve the efficiency of any gas turbine power cycle.

Many of the problems encountered in the development and design of the 3500-hp experimental unit were without precedent, the report said. For example, problem of thermal expansion alone required provisions in the combustion chambers, piping and turbines for each foot of the metal to expand over ⅛-in. in all directions when heated to 1500° F, and still remain pressure tight with an internal pressure of 45 psi. Provisions also were made to cool the bearing pedestals to prevent misalignment of bearings during high-temperature runs.

Cycle selected for this experimental unit is known as the parallel turbine regenerative cycle. Air enters the gas generator compressor at atmospheric pressure in which it is compressed to 45 psi gage pressure. The compressed air then enters the heat exchanger where, at full load, it is heated by the turbine exhaust gas from a temperature of 363° F at the compressor discharge to a temperature of 750° F at the entrance to the combustion chambers. After leaving the heat exchanger, preheated air flows directly downward into the two horizontal combustion chambers, one supplies the gas generator turbine driving the compressor and the other supplies the power turbine. With this arrangement it is possible to inde-

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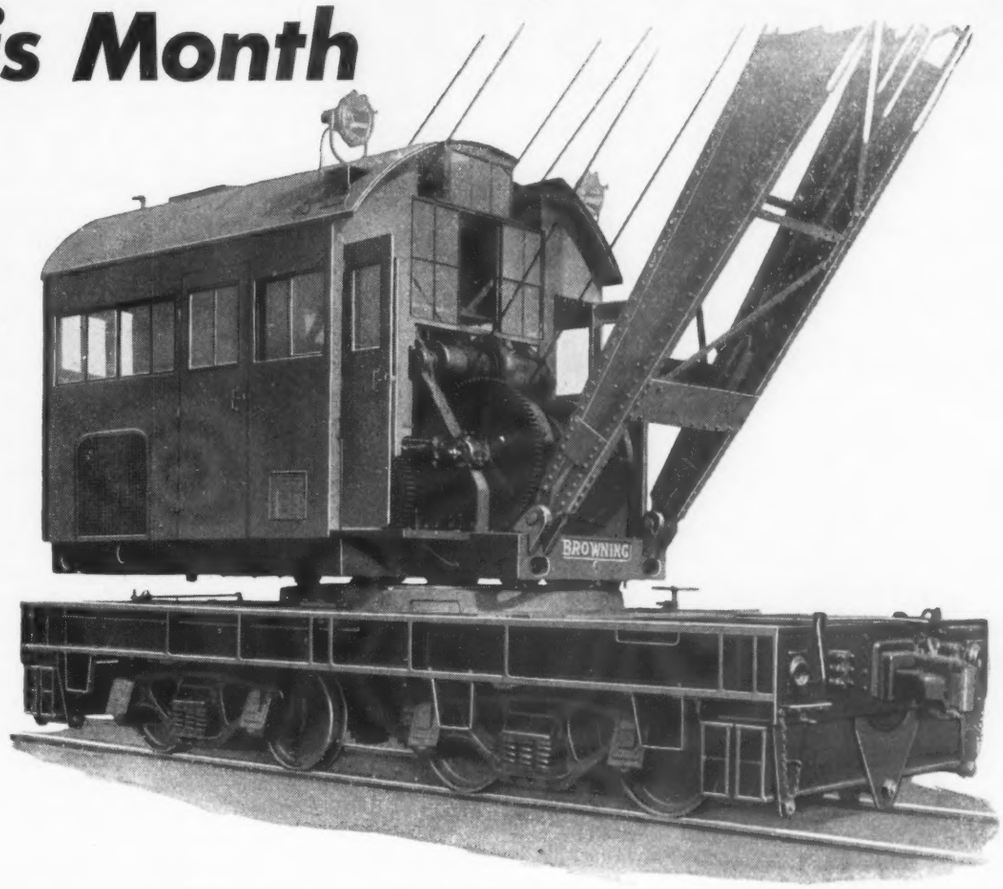

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pendently control the power generated by the gas generator and power turbines.

In the Annapolis unit, consideration was given to the safety and convenience of the research engineers charged with responsibility of carrying out the program. For example, the heavy pedestal between the gas generator turbine and the compressor is of steel with very heavy hold-down bolts. These features were introduced in order to insure that, in event of a possible failure of any turbine parts, the resulting vibration would not injure the axial flow compressor and its bearings. The heat exchanger and combustion chambers are installed some distance from the unit, whereas in a shipboard installation it would be necessary to place these above the propulsion turbines.

Axial-Flow Air Compressor

Following through from the point where the air enters the cycle, one of the essential features is the axial-flow air compressor. In this element there are 20 stages of airfoil section blades, so arranged that air is accelerated by the moving blades, then slowed down in the stationary elements in such a manner that part of the velocity energy is converted into pressure. This compressor runs at very high efficiency, about 85 per cent, when compressing the full load volume of 40,000 cu ft of air per min against the operating head of 45 psi gage pressure.

The regenerator, or heat exchanger, is interposed between the compressor discharge and the combustion chamber inlet, and is designed to recover a portion of the heat in the turbine exhaust gas which would otherwise be lost from the cycle. This heat is absorbed by high-pressure air on its way to the combustion chambers, and thus effectively reduces the amount of fuel required to raise the turbine inlet temperature to any desired value.

The regenerator is of the counter-flow type with the hot gas inside the tubes, and the high-pressure air on the outside. It has an external heating surface of 8500 sq ft, and is designed to have an effectiveness of approximately 60 per cent with relatively low pressure drops on the air and gas sides, the report said.

Each of the units' two combustion chambers is supplied with an oil burner in which the liquid fuel is broken up by mechanical atomization into extremely fine particles to promote rapid burning. Central flame tube is arranged to pass the proportion of the air flow necessary to support and complete combustion. Remainder of air flows between flame tube and the outer wall of the combustion chamber, thereby reducing the temperature of the flame tube to a safe operating level, and at the same time avoiding

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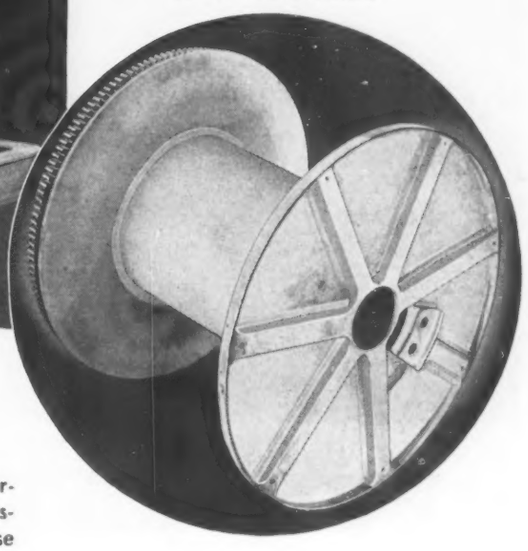

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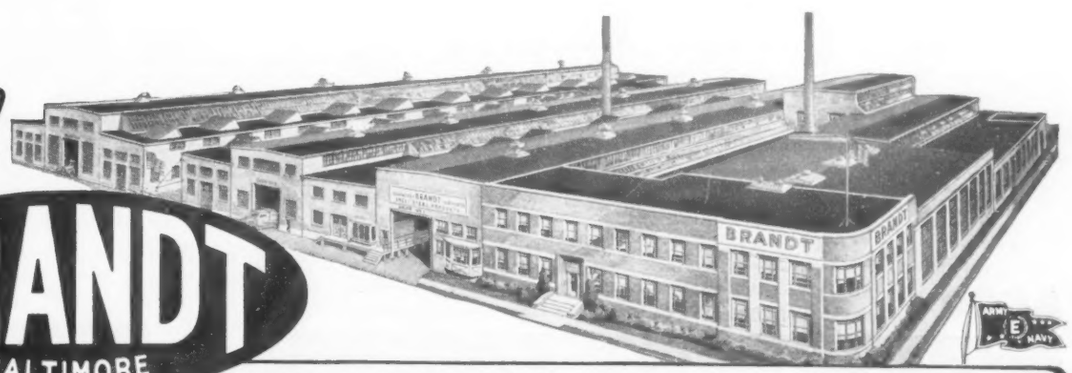

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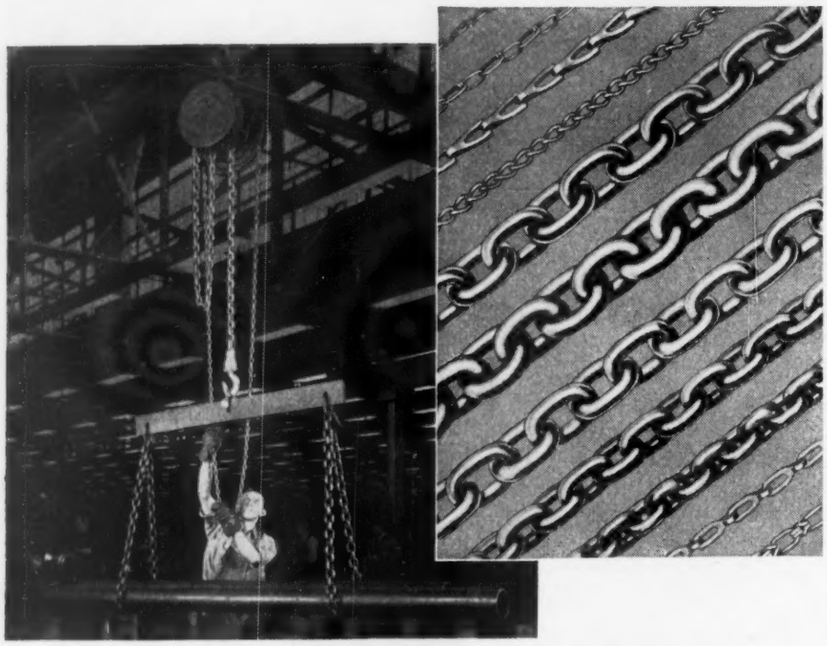

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the use of refractory brickwork. Cooling air and combustion gases are then intimately mixed by allowing the oppositely whirling concentric streams to come together at the end of the flame tube.

The heat released in these combustion chambers at full design load is approximately 2,500,000 Btu per cu ft per hr. The present unit is operating with No. 2 furnace oil. This class of oil distillate was adopted for the initial experimental tests because of its availability at the experiment station. In an ultimate installation, the report predicts fuels of grades as low as bunker C fuel oil will be used. Future plans for land installations contemplate burning powdered bituminous coal.

Fuel Control

In the simple arrangement of the combustion system, air leaving the axial flow compressor first passes through the regenerator, where it picks up waste heat from the turbine exhaust gases. The gas flow is further heated by the burning of fuel directly in the air stream. The form of the combustion chamber and the use of the air-cooled flame tube make unnecessary the use of brickwork, hence the unit will respond quickly to load changes, during which power demands are met by manual opening or closing of the two fuel valves. In a service installation, the fuel control may be reduced to a single, manually operated valve, the report stated.

The gas turbine which drives the axial flow compressor is substantially the same as the one that drives the water brake or dynamometer except that the compressor or gas generator turbine has somewhat longer blades and it is supplied with an air-operated internal bypass that is opened when starting. Each turbine has five pressure stages and operates at 5200 rpm at full load. The first two stages are of the impulse type in which the expansions from the upper to the lower stage pressures are substantially completed in each complete ring of nozzles which directs the high velocity gases on to the crescent-shaped moving blades. A diaphragm carries the nozzles that separate the first and second impulse states.

The last three stages are of the conventional reaction type, the last of these discharging the gas to the turbine exhaust chamber.

In cooling, the face of the high-temperature turbine wheel, air is carried through the outer of the two cooling tubes to a disk adjacent to the side of the high temperature wheel. A series of holes in the periphery of this stationary disk directs the cooling air to the side of the first stage turbine wheel. Cooling air then passes radially inward over the side of the disk, then out

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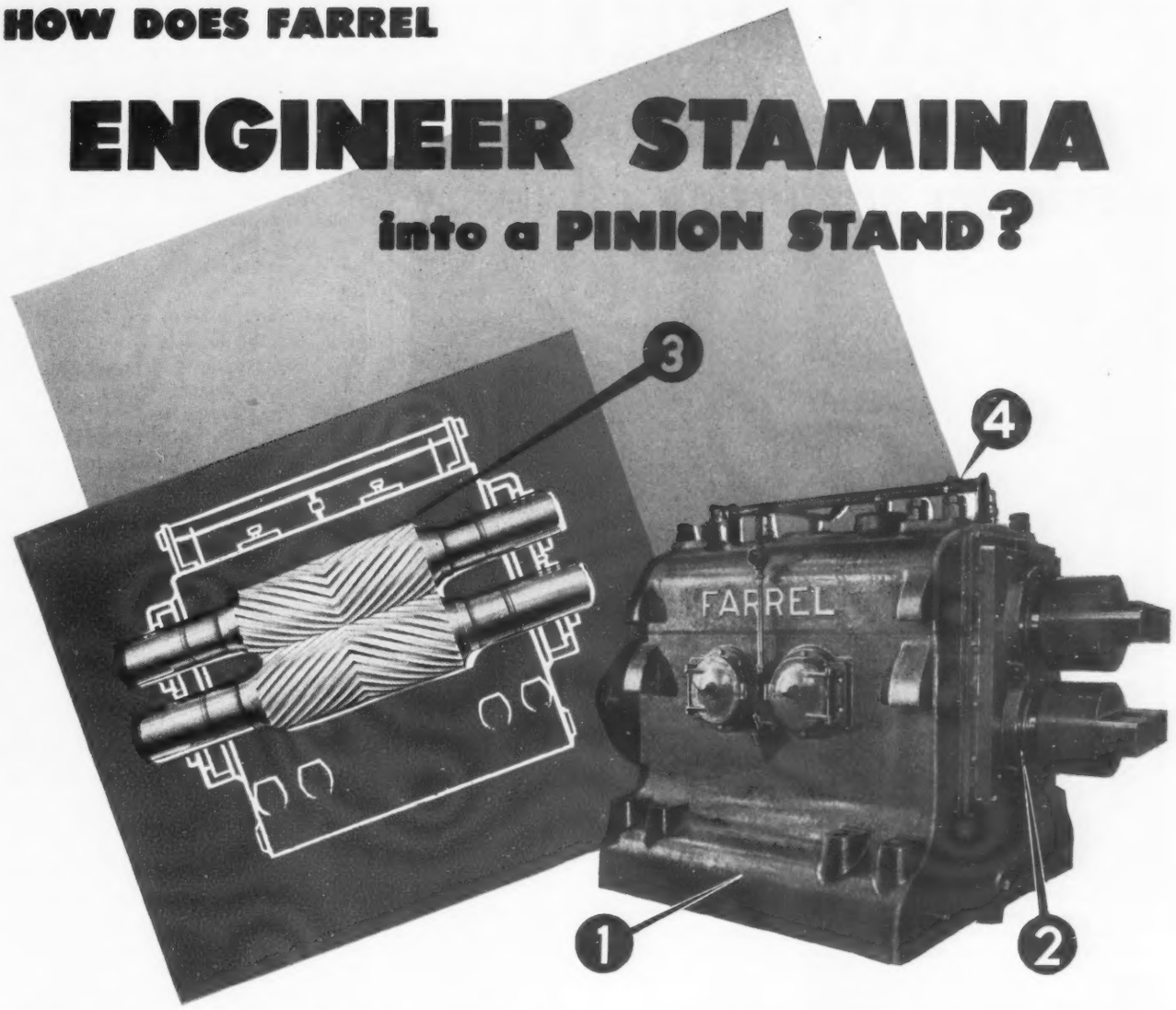

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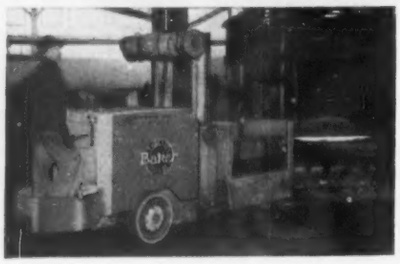

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through the center pipe to a water-cooled heat exchanger from which it is returned to the outer cooling duct by a positive pressure blower.

In like manner, cooling air is introduced around the periphery of the second stage diaphragm. It is led through radial holes to an annular passage around the center portion of the diaphragm, and then passes through a series of holes that allow the cooling air to blow on the downstream side of the high pressure wheel.

Blades and disks of the turbines are of a recently developed, high-temperature Timken alloy steel, which includes 16 per cent chromium, 25 per cent nickel, and 6 per cent molybdenum. Heavy stationary parts of the turbines are of an alloy steel containing 25 per cent chromium and 12 per cent nickel.

Many Pipes Used for Gases

The turbines and compressor use sleeve bearings throughout with pressure lubrication, oil being cooled and cleaned continuously during operation.

The turbines also are equipped with emergency overspeed and over temperature trips which automatically shut off the fuel supply and at the same time open up an atmospheric relief valve in the high-pressure air line ahead of the combustion chambers.

In a gas turbine power plant of 3500 hp capacity, enormous quantities of air and hot gases are continuously circulating through the system, requiring large pipes. The air intake pipe in the Annapolis unit is 36 in. in inside diameter, and the exhaust opening of the gas generator turbine is 42 in. in diameter in spite of rather high gas velocities. Pipes leading from the combustion chambers to the turbines appear large because the insulation necessary to withstand the hot gases at 1500° F is inside between the double-wall construction.

An internal gas guiding tube is installed in the large high-temperature piping, with a space of approximately 9 in. between the internal guiding wall and the outside pipe. This space is filled with mineral block insulation.

The swing type expansion joints consist of a series of radially placed hinges between the flanges, the arrangement being such that the rotation of the adjoining members operates to relieve the dimensional changes of the piping resulting from thermal expansion without the distortion of turbine and compressor parts.

The unit can be started with less than 100 hp, and an electric motor is connected to the compressor unit by a clutch for use up to a starting speed of approximately 25 to 35 per cent of full load speed. A gas turbine unit must be started with external power in

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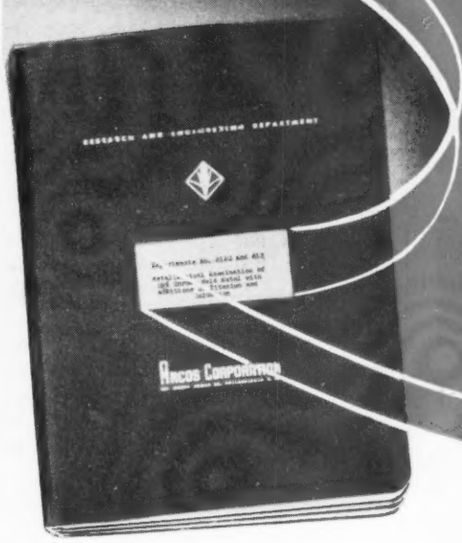

Many of the major advances in alloy welding come from the Arcos Research Department. A highly trained professional staff of physicists, chemists, and metallurgists is constantly at work on the problems of industry. The problems they solve are many and varied . . . a fabricator is guided to standardize on the proper electrode for a critical job . . . a specific metallurgical requirement is met . . . an electrode is developed for a new alloy steel . . . corrosion resistance of weld metals is constantly checked.

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Constant research on special problems as well as on Arcos standard electrodes means that Arcos trade-names CHROMEND (one of the lime-type coatings for DC) and STAINLEND (titania coating for AC-DC) may be specified with full confidence.

Successful alloy welding often depends on having complete, correct information. Here is a text book in wall chart form — the Arcos Reference Chart on Alloy Welding. A copy will be sent you on request.

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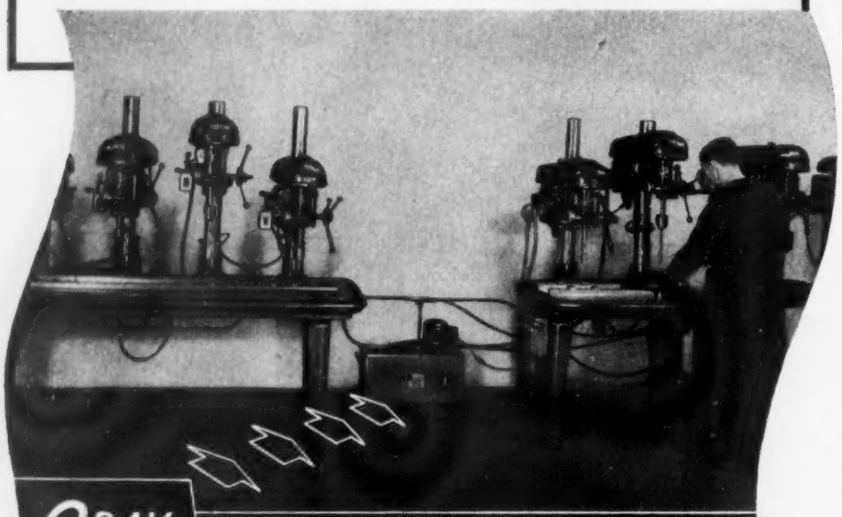

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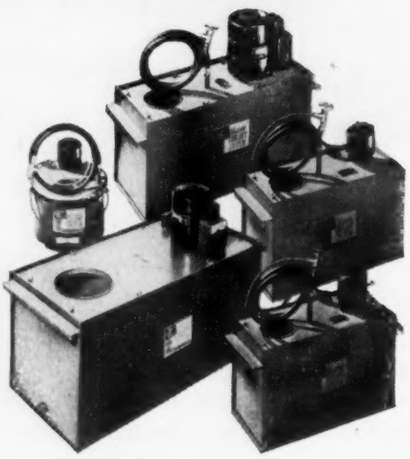

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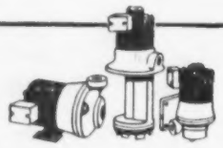

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much the same manner as a motor car engine. The starting motor is disengaged and shut down when the firing speed is reached, and the fuel is ignited in the combustion chambers.

With the vast number of possible conditions under which it is possible to test the 3500-hp Annapolis unit, the setting up of the instrumentation and the test schedules to obtain the desired information was an enormous task. The test plans include operating the unit for established periods of time under prearranged operating conditions, with gradually increasing turbine inlet temperatures. Each test operating period is followed by a complete disassembly and a full inspection with numerous measurements to determine what changes in high temperature parts have taken place. A complete set of runs was first made with the compressor at 40 per cent of full speed, followed by gradual increases up to full speed with the gas generator turbine inlet temperature up to 1050° F. Then the temperatures were gradually increased, making complete tests at each new level, until just recently when the power turbine was run at full speed and at 1350° F.

Turbine Operated at 5200 RPM

Both the gas generator turbine and the power turbine were operated at full speed of 5200 rpm for over 50 hr in November, 1945, with exceedingly smooth operation, and subsequent examination revealed an excellent condition of all parts. These runs were made with 1200° F inlet temperature on the power turbine and 1100° F on the gas generator turbine, the report said.

Continuing the test schedule, 50-hour runs were made recently with inlet temperatures of 1350° F on the power turbine and 1200° F on the gas generator turbine, again with very smooth operation and no serious complications.

Occasional minor mishaps have developed during the testing, but so far these have been overcome without serious difficulty, and the unit is delivering its expected performance. The unit has been in operation over 500 hr to date in accordance with the rigorous test schedule.

Tests completed so far have yielded much information which has heretofore never existed, particularly in regard to axial flow compressor characteristics over a wide range of operation, according to Allis-Chalmers.

It is pointed out that this gas turbine unit is an experimental one, designed particularly to obtain necessary information on the endurance life of gas turbine units with inlet temperatures up to 1500° F, and to that end, it has performed very satisfactorily to date.

From the present outlook, Allis-

Chalmers believes gas turbines of this type can be applied to the propulsion of ships with what is predicted to be lower weight per horsepower and smaller space occupancy than is now possible with other classes of propulsion equipment. There also is evidence units of this type can be built to operate at higher thermal efficiencies than now realized in marine steam turbine power plants operating in conventional pressure and temperature ranges.

It is to be expected that any new type of unit so radically different from former power plants, as the present one, must undergo substantial changes before there can be extended service application, the report said.

Lincoln Now Offers Two Improved Electrodes

Two improved electrodes for shielded arc welding of stainless steels, known as Stainweld A 7 and A 7-Cb are announced by Lincoln Electric Co., Cleveland. They are for welding steels of 18 per cent chromium and 8 per cent nickel type.

Stainweld A 7, discontinued during the war, for use with AISI stainless steels 304 and 308, produces smooth, steady arc with easy slag removal, and is used with DC or the higher voltage type AC welding units.

Stainweld A 7-Cb is columbium stabilized and has operating characteristics similar to Stainweld A 7. This electrode is for use with stabilized 18-8 stainless steels, AISI Nos. 321 and 347.

Both the A 7 and A 7-Cb electrodes also are recommended for weld-surfacing where an austenitic surface of medium hardness and good corrosion resistance is required.

Shape of weld bead with either electrode generally is convex. Properties of all-weld metal specimen: Tensile strength 85,000 to 95,000 psi. Elongation is 2 in., 35 per cent to 50 per cent.

Booklet Defines Steel Technical Terms

For the purpose of simplifying the many technical terms used in iron and steel industry, Mercantile Metal & Ore Corp., 60 Wall street, New York, has prepared a booklet on various definitions. Included in the booklet are a number of official gage and conversion tables of interest to steel consumers.

—o—

A composition talc crayon, developed to offset shortage of natural talc for marking purposes is now manufactured by American Crayon Co., Sandusky, O. Not meant to take place of natural talc, it is stated that there are many ways that the composition stick may be used.

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the BUSINESS TREND

DECLINE of steel ingot output as fuel supplies grow shorter continues its depressive effect on STEEL's industrial production index, which in the week ended Apr. 27 receded to 120 per cent (preliminary), compared with 122 per cent in the preceding week.

Part of the decline resulting from lowered production of steel was offset by increasing output of automobiles, but the auto industry's prevailing uptrend likely will be shortlived because of the paralyzing influence of the bituminous coal miners' strike on the steel supply.

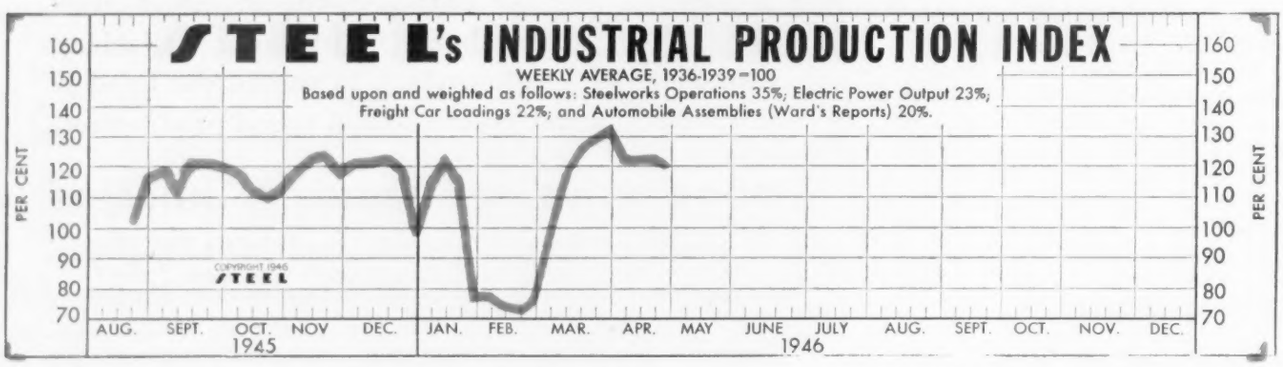
COAL—Output of soft coal this year through Apr. 20 had fallen 10.7 per cent, or 19,637,000 tons, behind that for the corresponding period of last year as a result of the current strike of miners. When the strike began, the 1946 cumulative production was 4.7 per cent ahead of the corresponding 1945 output.

ELECTRIC POWER—Another threat to industry is the possibility of curtailed supplies of electricity. Although some power companies are in a relatively good position with respect to coal supplies, others are not so fortunate. Already, some power companies are considering resort to "brown-outs," such as those of the recent wartime period, as a means of reducing usage of electricity and thereby delaying the exhaustion of coal supplies. Total amount of electric power distributed thus far in 1946 is only 10 per cent less than during the corresponding period of last year when war production and usage of electric power were at a high rate, but is 79 per cent greater than in the like period of 1939.

INDUSTRIAL PRODUCTION—Decreases in coal and steel production probably will lower the Federal Reserve Board's industrial production index for April by three or four points, that agency predicts. The board's March index registered 169 per cent of the 1935-1939 average, compared with 153 per cent in February. The large increase in the index in March was due mainly to a sharp recovery in steel ingot production following settlement of the steel strike.

STRUCTURAL STEEL—Estimated March bookings of fabricated structural steel for bridge and building construction totaled 164,568 tons, a 35 per cent increase over February. March shipments totaled 86,872 tons, a 36,607-ton increase over February, when production was curtailed by effects of the steel strike. Available for future fabrication were 604,687 tons at the end of March.

CONSTRUCTION—Rising to the highest dollar volume for the first quarter of a year since 1928, construction contracts awarded for 74,677 projects in the 37 states east of the Rocky mountains totaled $1,442,493,000 in the first quarter of 1946. Gains in home building were most pronounced, but increases in nonresidential construction and public works and utilities were sizable also.



The Index (see chart above): **Latest Week (preliminary) 120** Previous Week 122 Month Ago 132

FIGURES THIS WEEK

INDUSTRY

	Latest Period*	Prior Week	Month Ago	Year Ago
Steel Ingot Output (per cent of capacity)#	70	74.5	89.5	94
Electric Power Distributed (million kilowatt hours)	3,977	3,987	3,992	4,416
Bituminous Coal Production (daily av.—1000 tons)	117	108	2,196	1,872
Petroleum Production (daily av.—1000 bbls.)	4,672	4,686	4,424	4,805
Construction Volume (ENR—Unit $1,000,000)	$131.6	$154.7	$134.9	$32.3
Automobile and Truck Output (Ward's—number units)	64,620	57,565	43,070	20,045

*Dates on request. #1946 weekly capacity is 1,762,381 net tons. 1945 weekly capacity was 1,831,636 net tons.

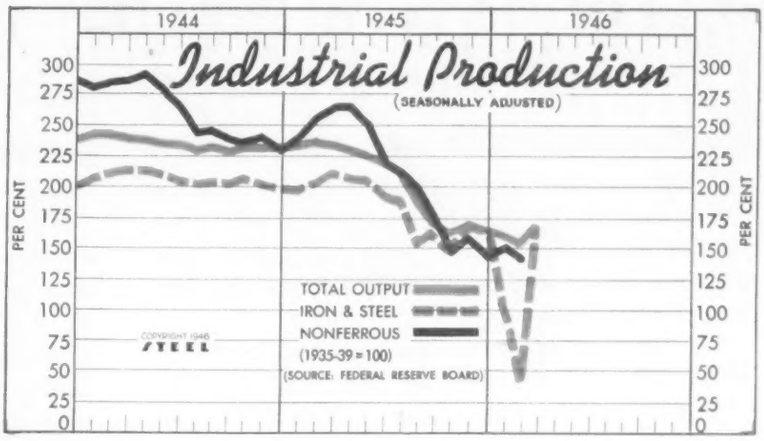
TRADE

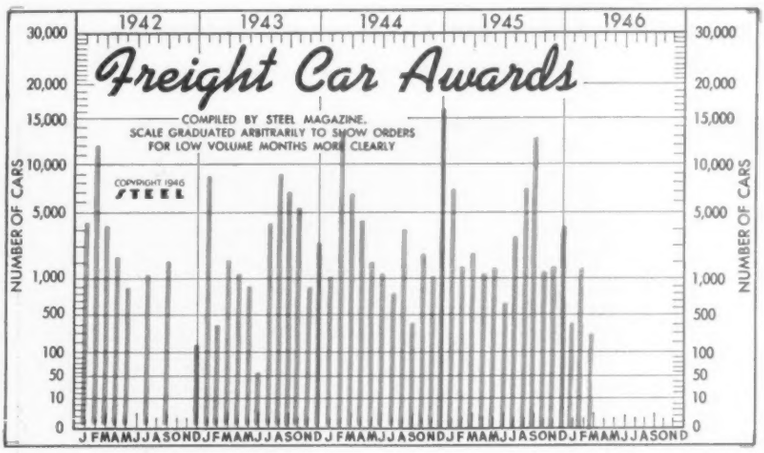
Freight Carloadings (unit—1000 cars)	650†	651	809	899
Business Failures (Dun & Bradstreet, number)	17	16	18	20
Money in Circulation (in millions of dollars)‡	$27,877	$27,948	$27,842	$26,074
Department Store Sales (change from like week a year ago)‡	+51%	+81%	+12%	+18%

†Preliminary. ‡Federal Reserve Board.

Federal Reserve Board's Production Indexes
(1935-39=100)

	Total Production		Iron, Steel		Nonferrous	
	1946	1945	1946	1945	1946	1945
Jan.	159	234	105	197	150	240
Feb.	153	236	43	202	141	257
Mar.	169	235	170	210	...	265
Apr.	...	231	...	206	...	264
May	...	226	...	204	...	251
June	...	220	...	192	...	219
July	...	211	...	187	...	210
Aug.	...	187	...	155	...	198
Sept.	...	171	...	163	...	176
Oct.	...	163	...	146	...	147
Nov.	...	168	...	167	...	159
Dec.	...	164	...	165	...	144
Avge.	...	204	...	183	...	211




1942
1943
1944
1945
1946
Freight Car Awards
COMPILED BY STEEL MAGAZINE.
SCALE GRADUATED ARBITRARILY TO SHOW ORDERS FOR LOW VOLUME MONTHS MORE CLEARLY
COPYRIGHT 1946 STEEL
NUMBER OF CARS
30,000
20,000
15,000
10,000
5,000
1,000
500
100
50
10
0
J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D

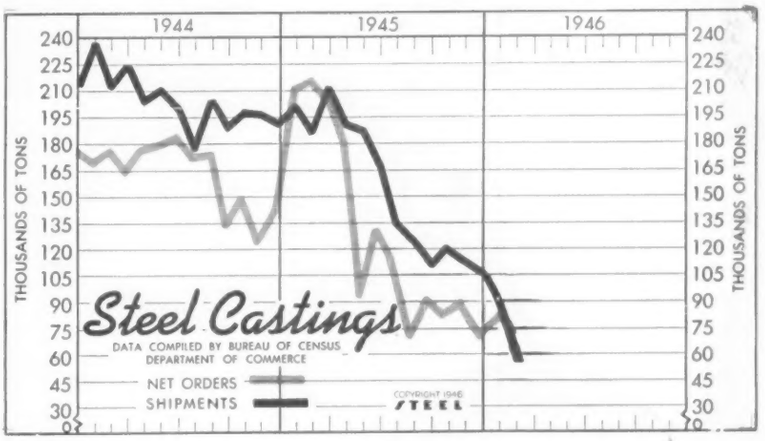
Freight Car Awards

	1946	1945	1944	1943
Jan.	420	7,200	1,020	8,365
Feb.	1,795	1,750	13,240	350
Mar.	300	2,500	6,510	1,935
Apr.	....	1,120	4,519	1,000
May	....	1,526	1,952	870
June	....	670	1,150	50
July	....	3,500	795	4,190
Aug.	....	7,240	3,900	8,747
Sept.	....	12,840	400	6,820
Oct.	....	1,320	2,425	5,258
Nov.	....	1,650	1,065	870
Dec.	....	4,116	16,245	2,919
Total	....	45,432	53,221	41,374

Commercial Steel Castings
(Net tons in thousands)

	New Orders†		Shipments‡	
	1946	1945	1946	1945
Jan.	88.2	210.2	93.0	201.2
Feb.	72.5	214.4	55.9	186.4
Mar.	....	203.2	....	211.9
Apr.	....	177.7	....	190.2
May	....	89.8	....	186.4
June	....	130.2	....	167.1
July	....	110.7	....	133.6
Aug.	....	68.3	....	123.8
Sept.	....	89.7	....	110.6
Oct.	....	79.8	....	119.9
Nov.	....	85.9	....	113.7
Dec.	....	70.1	....	106.1
Ave.	....	128.0	....	154.2

†For sale. ‡For sale and own use.



FINANCE

	Latest Period*	Prior Week	Month Ago	Year Ago
Bank Clearings (Dun & Bradstreet—millions)	$11,370	$12,300	$11,801	$10,106
Federal Gross Debt (billions)	$274.3	$274.3	$276.8	$235.7
Bond Volume, NYSE (millions)	$29.8	$19.6	$25.7	$81.4
Stocks Sales, NYSE (thousands)	7,282	6,430	6,804	8,280
Loans and Investments (billions)†	$65.5	$65.8	$66.3	$57.3
United States Gov't. Obligations Held (millions)†	$47,050	$46,689	$47,458	$43,143

†Member banks, Federal Reserve System.

PRICES

STEEL's composite finished steel price average	$63.54	$63.54	$63.54	$57.55
All Commodities†	109.6	109.3	108.4	105.6
Industrial Raw Materials†	123.0	122.8	120.9	117.7
Manufactured Products†	105.1	104.8	104.3	101.9

†Bureau of Labor Statistics Index, 1926 = 100.

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Greater safety results from the increased toughness and balanced flexibility of an entirely new bonding material. And in addition to providing fast cutting, this balanced flexibility permits side grinding and close following of contours with the danger of wheel breakage greatly reduced — an amazingly safer wheel.

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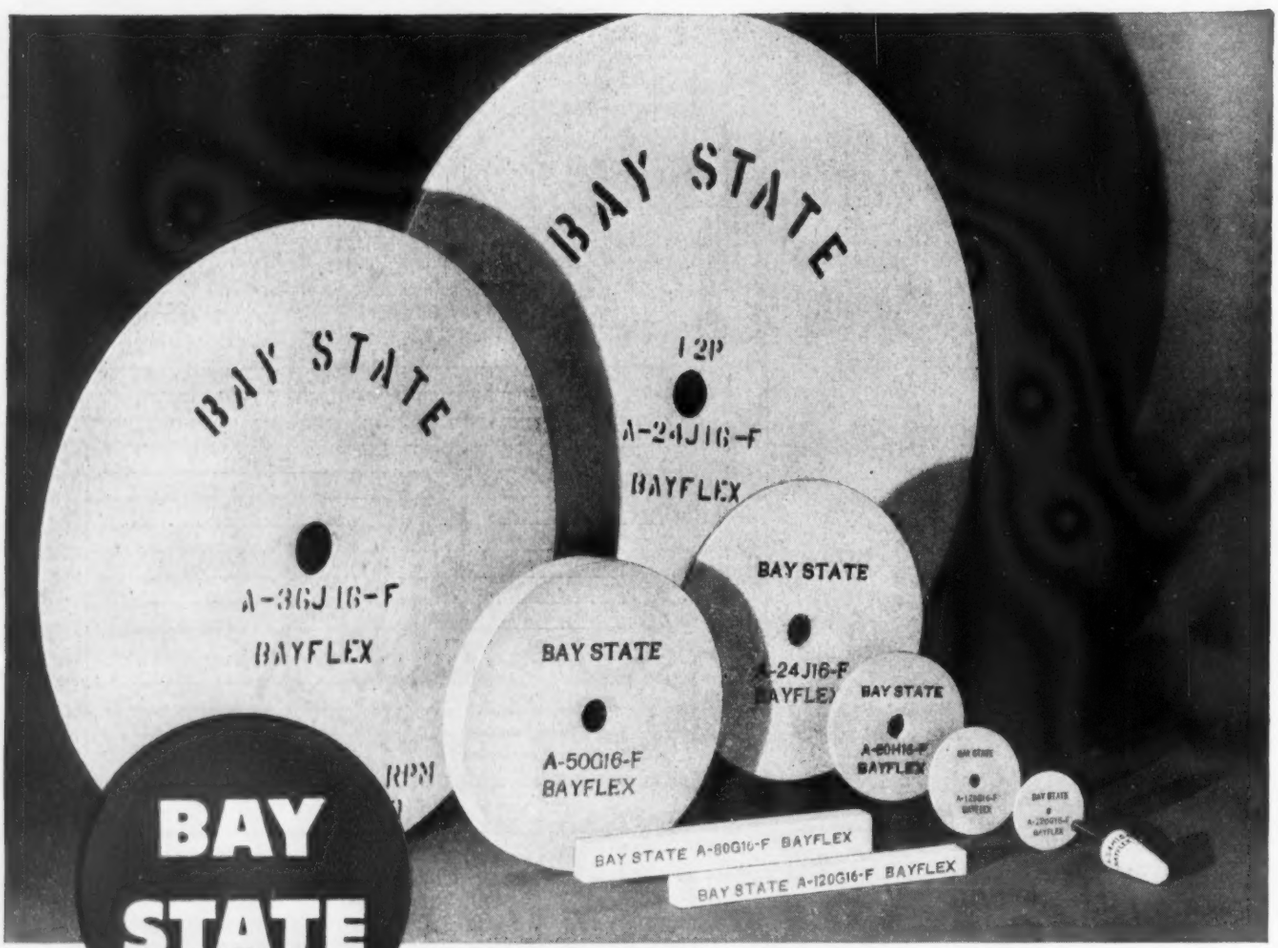

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MARKET SUMMARY

Mills Unable To Make Steel Delivery Promises

Production declines slowly as fuel fails . . .
Mills approach sharper cuts in near future . . .
Scrap supply shows no gain

STEEL producers find increasing difficulty in making delivery promises, most of them not attempting it, and also in meeting those already made. Practically all are well behind on shipments already scheduled.

Production is declining as the soft coal strike enters its sixth week, and some plants that have been able to maintain operations fairly well until now are at a reduced rate, with others suspended entirely. Some steelmaking units confronted by serious curtailment are setting up vacation schedules for this time instead of later. This policy is being adopted also by various consuming plants, notably foundries, who find they have gone as far as fuel and metal supply will permit. In some foundries lack of coke is more of an obstacle than the pig iron shortage.

Coal shortage is increasingly affecting output of coke and some by-product plants have been reduced to 25 per cent of capacity.

Numerous steel plants have reduced operations while some others, in better position on fuel, estimate they can continue at practically full rate until the middle of May and after that will be forced to reduce sharply.

Two eastern platemakers, Lukens Steel Co., Coatesville, Pa., and Worth Steel Co., Claymont, Del., have been allowed to increase base prices on plates, following similar permission to Central Iron & Steel Co., Harrisburg, Pa. Another platemaker has asked similar concession.

Steel mills continue to resist the downward pull of fuel shortage and the general rate is yielding slowly, much less precipitously than had been expected. The estimated national rate for last week dropped 5½ points to 64½ per cent of capacity. Pittsburgh declined 4½ points to 54½ per cent, from a revised rate of 59 per cent for the prior week. Youngstown lost 8 points to 52 per cent, Chicago 4½ points to 66½, Buffalo 14 points to 74½, Cleveland 8 points to 87, eastern Pennsylvania 8 points to 71, Detroit 3 points to 87, St. Louis 4½ points to 49½, and New England 3 points to 85. Cincinnati alone showed an increase, rising 4 points to 83. Birmingham held unchanged at 64 per cent and Wheeling at 86. West Coast producers increased production 2½ points to 84 per cent.

Blast furnaces continue to be banked as coke supply fails and a number are on reduced blast to conserve fuel. Pig iron shipments are being apportioned carefully to supply melters as well as possible. Melters have long since stopped insisting on close specifications and are resorting to ferroalloy additions to sweeten mixtures. Attempts to eke out pig iron supply by larger use of scrap bring little success on account of lack of cast scrap.

Warehouses in general did more business in April than in any recent month, supplying consumer needs that mills could not fill. As a result their stocks are depleted and outlook for May is not as bright. In many items seasonally in demand stocks are practically sold out, including wire nails and fencing, while structurals and sheets are scarce.

Pig iron production in March went back to normal after the low rate in January and February, during the steel strike, with output of 4,384,057 net tons of pig iron and 39,859 tons of ferromanganese and spiegeleisen, a total of 4,423,916 tons. This was at 77.3 per cent of capacity, compared with an average of 49.5 per cent for first quarter. Production for April will be smaller because of numerous interruptions during the soft coal strike.

In spite of reduced steel production no easing in pressure for steel and iron scrap is noted, as scrap is being substituted for pig iron during shortage of that material and steelmakers seek to build reserves for use when production is resumed at a higher rate. Shrinkage in industrial scrap is noted as fabricators taper operations because of lack of steel and railroad offerings are much below normal. Low phos grades continue to be bought for open-hearth use in spite of the higher price, and consumers pay high freight charges to bring in material from a distance.

DISTRICT STEEL RATES

(Percentage of Ingot Capacity Engaged in Leading Districts)

	Week Ended May 4	Change	Same Week 1945	Same Week 1944
Pittsburgh	54.5	—4.5	92	94
Chicago	66.5	—4.5	98	101.5
Eastern Pa.	71	—8	93	94
Youngstown	52	—8	94	96
Wheeling	86	None	97	100
Cleveland	87	—8	92.5	94
Buffalo	74.5	—14	90.5	90.5
Birmingham	64	None	95	95
New England	85	—3	90	88
Cincinnati	83	+4	90	89
St. Louis	49.5	—4.5	80	77
Detroit	87	—3	86	88
Estimated national rate	64.5	—5.5	95	99

Based on weekly steelmaking capacities of 1,762,381 net tons for 1946; 1,831,636 tons for 1945; 1,791,287 tons for 1944.

COMPOSITE MARKET AVERAGES

	May 4	Apr. 27	Apr. 20	One Month Ago Apr., 1946	Three Months Ago Feb., 1946	One Year Ago May, 1945	Five Years Ago May, 1941
Finished Steel	$63.54	$63.54	$63.54	$63.54	$60.91	$57.73	$56.73
Semifinished Steel	40.60	40.60	40.60	40.60	37.80	36.00	36.00
Steelmaking Pig Iron	25.50	25.50	25.50	25.50	24.75	24.00	23.00
Steelmaking Scrap	19.17	19.17	19.17	19.17	19.17	19.13	19.17

Finished Steel Composite:—Average of industry-wide prices on sheets, strips, bars, plates, shapes, wire, nails, tin plate, standard and line pipe. Semifinished Steel Composite:—Average of industry-wide prices on billets, slabs, sheet bars, skelp and wire rods. Steelmaking Pig Iron Composite.—Average of basic pig iron prices at Bethlehem, Birmingham, Buffalo, Chicago, Cleveland, Neville Island, Granite City and Youngstown. Steelworks Scrap Composite:—Average of No. 1 heavy melting steel prices at Pittsburgh, Chicago and eastern Pennsylvania. Finished steel, net tons; others, gross tons.

COMPARISON OF PRICES

Representative Market Figures for Current Week; Average for last Month, Three Months and One Year Ago

Finished Material and Wire Rods, cents per lb; coke, dollars per net ton; others dollars per gross ton.

Finished Material

	May 4, 1946	Apr., 1946	Feb., 1946	May, 1945
Steel bars, Pittsburgh	2.50c	2.50c	2.375c	2.17c
Steel bars, Philadelphia	2.82	2.82	2.695	2.495
Steel bars, Chicago	2.50	2.50	2.375	2.17
Shapes, Pittsburgh	2.35	2.35	2.225	2.10
Shapes, Philadelphia	2.465	2.465	2.340	2.215
Shapes, Chicago	2.35	2.35	2.225	2.10
Plates, Pittsburgh	2.50	2.50	2.375	2.212
Plates, Philadelphia	2.55	2.55	2.425	2.263
Plates, Chicago	2.50	2.50	2.375	2.22
Sheets, hot-rolled, Pittsburgh	2.425	2.425	2.3125	2.20
Sheets, cold-rolled, Pittsburgh	3.275	3.275	3.165	3.05
Sheets, No. 24 galv., Pittsburgh	4.05	4.05	3.875	3.65
Sheets, hot-rolled, Gary	2.425	2.425	2.3125	2.20
Sheets, cold-rolled, Gary	3.275	3.275	3.1625	3.05
Sheets, No. 24 galv., Gary	4.05	4.05	3.875	3.662
Hot-rolled strip, over 6 to 12-in., Pitts.	2.35	2.35	2.225	2.10
Cold-rolled strip, Pittsburgh	3.05	3.05	2.925	2.80
Bright basic, bess. wire, Pittsburgh	3.05	3.05	2.90	2.64
Wire nails, Pittsburgh	3.25	3.25	3.075	2.82
Tin plate, per base box, Pittsburgh	$5.25	$5.25	$5.125	$5.00

Semifinished Material

Sheet bars, Pittsburgh, Chicago	$38.00	$38.00	$37.00	$34.50
Slabs, Pittsburgh, Chicago	39.00	39.00	37.50	34.50
Rerolling billets, Pittsburgh	39.00	39.00	37.50	34.50
Wire rods, No. 5 to $\frac{9}{32}$-inch, Pitts.	2.30c	2.30c	2.225c	2.05c

Pig Iron

	May 4, 1946	Apr., 1946	Feb., 1946	May, 1945
Bessemer, del. Pittsburgh	$27.69	$27.69	$26.94	$26.19
Basic, Valley	26.00	26.00	25.25	24.50
Basic, eastern del. Philadelphia	27.84	27.84	27.09	26.34
No. 2 fdry., del. Pgh. N. & S. sides	27.19	27.19	26.44	25.69
No. 2 foundry, Chicago	26.50	26.50	25.75	25.00
Southern No. 2, Birmingham	22.88	22.88	22.13	21.38
Southern No. 2 del. Cincinnati	26.94	26.94	26.19	25.44
No. 2 fdry., del. Philadelphia	28.34	28.34	27.59	26.34
Malleable, Valley	26.50	26.50	25.75	25.00
Malleable, Chicago	26.50	26.50	25.75	25.00
Charcoal, low phos., fob Lyles, Tenn.	33.00	33.00	33.00	33.00
Gray forge, del. Pittsburgh	26.69	26.69	25.94	25.19
Ferromanganese, del. Pittsburgh	140.00	140.00	140.00	140.33

Scrap

Heavy melting steel, No. 1, Pittsburgh	$20.00	$20.00	$20.00	$20.00
Heavy melt. steel, No. 2, E. Pa.	18.75	18.75	18.75	18.56
Heavy melting steel, Chicago	18.75	18.75	18.75	18.75
Rails for rolling, Chicago	22.25	22.25	22.25	22.25
No. 1 cast, Chicago	20.00	20.00	20.00	20.00

Coke

Connellsville, furnace ovens	$7.50	$7.50	$7.50	$7.00
Connellsville, foundry ovens	8.25	8.25	8.25	7.75
Chicago, by-product fdry., del.	13.75	13.75	13.75	13.35

STEEL, IRON, RAW MATERIAL, FUEL AND METALS PRICES

Following are maximum prices established by OPA schedules, except those for stainless steels which are now exempt from price control. Price schedule No. 6 covers semifinished and finished iron and steel products; by-product foundry coke, No. 29; relaying rails, No. 46; beehive oven coke, No. 77; bolts, nuts and rivets, No. 147; coke by-products, GMPR, except sulphate of ammonia, No. 205. Finished steel quoted in cents per pound and semifinished steel in dollars per gross ton, except as otherwise noted. Pricing on rails was changed to net ton basis as of Feb. 15, 1946.

Semifinished Steel

Carbon Steel Ingots: Fob mill base, rerolling quality, standard analysis, $33.

Alloy Steel Ingots: Pittsburgh, Chicago, Buffalo, Bethlehem, Canton, Massillon; uncrop, $46.80.

Rerolling Billets, Blooms, Slabs: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Sparrows Point, Birmingham, Youngstown, $39; Detroit, del., $41; Duluth (billets), $41; Pac. ports (billets), $51. (Andrews Steel Co., carbon slabs, $41; Northwestern Steel & Wire Co., $41, Sterling, Ill.; Granite City Steel Co. $47.50 gross ton slabs from D.P.C. mill. Geneva Steel Co. $58.64, Pac. ports.)

Forging Quality Blooms, Slabs, Billets: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham, Youngstown, $47; Detroit, del., $49; Duluth, billets, $49; forging billets fob Pac. ports, $59.

(Andrews Steel Co. may quote carbon forging billets $50 gross ton at established basing points; Follansbee Steel Corp., $49.50 fob Toronto, O.; Geneva Steel Co. $64.64, Pacific ports.)

Alloy Billets, Slabs, Blooms: Pittsburgh, Chicago, Buffalo, Bethlehem, Canton, Massillon, $56.16; del. Detroit $58.16; eastern Mich. $59.16.

Sheet Bars: Pittsburgh, Chicago, Cleveland Buffalo, Canton, Sparrows Point, Youngstown, $38. (Empire Sheet & Tin Plate Co., Mansfield, O., carbon sheet bars, $39, fob mill.)

Skelp: Pittsburgh, Chicago, Sparrows Point, Youngstown, Coatesville, lb, 2.05c.

Wire Rods: Pittsburgh, Chicago, Cleveland, Birmingham, No. 5—$\frac{5}{16}$ in. inclusive, per 100 lb, $2.30. Do., over $\frac{5}{16}$—$\frac{47}{64}$-in., incl., $2.45; Galveston, base, $2.40 and $2.55, respectively. Worcester add $0.10; Pacific ports $0.50.

Bars

Hot-Rolled Carbon Bars and Bar-Size Shapes under 3-in.: Pittsburgh, Youngstown, Chicago, Gary, Cleveland, Buffalo, Birmingham base, 20 tons one size, 2.50c; Duluth, base, 2.60c; Detroit, del., 2.60c; eastern Mich., 2.65c; New York, del., 2.84c; Phila., del., 2.82c; Gulf ports, dock, 2.85c; Pac. ports, dock, 3.15c. (Sheffield Steel Corp., 2.75c, fob St. Louis; Joslyn Mfg. & Supply Co., may quote 2.55c, fob Chicago.)

Rail Steel Bars: Same prices as for hot-rolled carbon bars except base is 5 tons.

Hot-Rolled Alloy Bars: Pittsburgh, Youngstown, Chicago, Canton, Massillon, Buffalo, Bethlehem, base 20 tons one size, 2.81c; Detroit, del., 2.91c. (Texas Steel Co. may use Chicago base price as maximum fob Fort Worth, Tex., price on sales outside Texas, Oklahoma.)

AISI Series	(*Basic O-H)	AISI Series	(*Basic O-H)
1300	$0.104	4300	$1.768
2300	1.768	4600	1.248
2500	2.652	4800	2.236
3000	0.52	5100	0.364
3100	0.884	5130 or 5152	0.468
3200	1.404	6120 or 6152	0.988
3400	3.328	6145 or 6150	1.248
4000	0.468	8612	0.676
4100 (.15-.25 Mo)	0.728	8720	0.728
(.20-.30 Mo)	0.78	9830	1.352

*Add 0.25 for acid open-hearth; 0.50 electric.

Cold-Finished Carbon Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base, 20,000-39,999 lb, 3.10c; Detroit, 3.15c; Toledo, 3.25c.

Cold-Finished Alloy Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base, 3.48c; Detroit, del., 3.58c; eastern Mich., 3.63c.

Reinforcing Bars (New Billet): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Sparrows Point, Buffalo, Youngstown, base, 2.35c; Detroit, del., 2.45c; eastern Mich. and Toledo, 2.50c; Gulf ports, dock, 2.70c; Pacific ports, dock, 2.75c.

Reinforcing Bars (Rail Steel): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Buffalo, base, 2.35c; Detroit, del., 2.45c; eastern Mich. and Toledo, del., 2.50c; Gulf ports, dock, 2.70c.

Iron Bars: Single refined, Pitts., 4.76c; double refined, 5.84c; Pittsburgh, staybolt, 6.22c; Terre Haute, single ref., 5.42c; double ref., 6.76c.

Sheets, Strip

Hot-Rolled Sheets: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Buffalo, Youngstown, Sparrows Pt., Middletown, base, 2.425c; Granite City, base, 2.525c; Detroit, del., 2.525c; eastern Mich., del., 2.575c; Phila., del., 2.595c; New York, del., 2.665c; Pacific ports, 2.975c. (Andrews Steel Co. may quote hot-rolled sheets for shipment to the Detroit area on the Middletown, O., base; Alan Wood Steel Co., Conshohocken, Pa., may quote 2.60c on hot carbon sheets, nearest eastern basing point.)

Cold-Rolled Sheets: Pittsburgh, Chicago, Cleveland, Gary, Buffalo, Youngstown, Middletown, base, 3.275c; Granite City, base, 3.375c; Detroit, del., 3.375c; eastern Mich., del., 3.425c; New York, del., 3.615c; Phila., del., 3.595c; Pacific ports, 3.925c.

Galvanized Sheets, No. 24: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Youngstown, Sparrows Point, Middletown, base, 4.05c; Granite City, base, 4.15c; New York, del., 4.29c; Phila., del., 4.22c; Pacific ports, 4.60c.

Corrugated Galv. Sheets: Pittsburgh, Chicago, Gary, Birmingham, 29-gage, per square, 3.73c.

Culvert Sheets: Pittsburgh, Chicago, Gary, Birmingham, 16-gage not corrugated, copper alloy, 4.15c; Granite City, 4.25c; Pacific ports, 4.60c; copper iron, 4.50c; pure iron, 4.50c; zinc-coated, hot-dipped, heat-treated, No. 24, Pittsburgh, 4.60c.

Aluminized Sheets, 20 gage: Pittsburgh, hot-dipped, coils or cut to lengths, 9.00c.

Enameling Sheets: 10-gage: Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, base 3.20c; Granite City, base 3.30c; Detroit, del., 3.30c; eastern Mich., 3.35c; Pacific ports, 3.85c; 20-gage: Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, base, 3.80c; Detroit, del., 3.90c; eastern Mich., 3.95c; Pacific ports, 4.45c.

Electrical Sheets No. 24:

	Pittsburgh Base	Pacific Ports	Granite City
Field grade	3.90c	4.65c	4.00c
Armature	4.25c	5.00c	4.35c
Electrical	4.75c	5.50c	4.85c
Motor	5.425c	6.175c	5.525c
Dynamo	6.125c	6.875c	6.225c
Transformer			
72	6.625c	7.375c	.....
65	7.625c	8.375c	.....
58	*8.125c	8.875c	.....
52	8.925c	9.675c	.....

Hot-Rolled Strip: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Middletown, base, 6-inch and narrower, 2.45c; Detroit, del., 2.55c; eastern Mich., 2.60c; Pacific ports, 3.10c; over 6-inch, base, 2.35c; Detroit, del., 2.46c; eastern Mich., 2.50c; Pacific ports, 3.00c.

Cold-Rolled Strip: Pittsburgh, Cleveland, Youngstown, 0.25 carbon and less, 3.05c; Chicago, base, 3.15c; Detroit, del., 3.15c; eastern Mich., del., 3.20c; Worcester, base, 3.25c.

Cold-Finished Spring Steel: Pittsburgh, Cleveland, base, 0.26-0.50 carbon, 3.05c. Add 0.20c for Worcester.

Tin, Terne Plate

(OPA ceiling prices announced March 1, 1946.)

Tin Plate: Pittsburgh, Chicago, Gary, 100-lb base box, $5.25; Granite City, Birmingham, Sparrows Point, $5.35.

Electrolytic Tin Plate: Pittsburgh, Gary, 100-lb base box, 0.25 lb tin, $4.60; 0.50 lb tin, $4.75; 0.75 lb tin, $4.90; Granite City, Birmingham, Sparrows Point, $4.70, $4.85, $5.00, respectively.

Tin Mill Black Plate: Pittsburgh, Chicago, Gary, base 29-gage and lighter, 3.30c; Granite City, Birmingham, Sparrows Point, 3.40c; Pacific ports, boxed, 4.30c.

Long Ternes: Pittsburgh, Chicago, Gary, No. 24 unassorted, 4.05c; Pacific ports, 4.80c.

Manufacturing Ternes (Special Coated): Pittsburgh, Chicago, Gary, 100-base box, $4.55; Granite City, Birmingham, Sparrows Point, $4.65.

Roofing Ternes: Pittsburgh base per package 112 sheets; 20 x 28 in., coating I. C. 8-lb $12.50; 20-lb $15.50 (nom.); 40-lb $20.00 (nom.).

Plates

Carbon Steel Plates: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Sparrows Point, Coatesville, Claymont, 2.50c; New York, del., 2.69c; Phila., del., 2.55c; St. Louis, 2.74c; Boston, del., 2.82-3.07c; Pacific ports, 3.05c; Gulf ports, 2.85c.

(Granite City Steel Co. may quote carbon plates 2.65c fob D.P.C. mill; Geneva Steel Co., Provo, Utah, 3.20c fob Pac. ports; Central Iron & Steel Co., Harrisburg, Pa., 2.80c, basing points; Lukens Steel Co., Coatesville, Pa., 2.75c, base; Worth Steel Co., Claymont, Del., 2.60c, base.)

Floor Plates: Pittsburgh, Chicago, 3.75c; Pacific ports, 4.40c; Gulf ports, 4.10c.

Open-Hearth Alloy Plates: Pittsburgh, Chicago, Coatesville, 3.75c; Gulf ports, 4.20c; Pacific ports, 4.40c.

Clad Steel Plates: Coatesville, 10% cladding; nickel-clad, 18.72c; inconel-clad, 26.00c; monel-clad, 24.96c.

Shapes

Structural Shapes: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Bethlehem, 2.35c; New York, del., 2.52c; Phila., del., 2.465c; Pacific ports, 3.00c; Gulf ports, 2.70c.

(Phoenix Iron Co., Phoenixville, Pa., may quote the equivalent of 2.45c, Bethlehem, Pa., on the general range and 2.55c on beams and channels from 4 to 10 inches.)

Steel Piling: Pittsburgh, Chicago, Buffalo, 2.65c; Pacific ports, 3.20c.

Wire and Wire Products

(Fob Pittsburgh, Chicago, Cleveland and Birmingham, per 100 pounds)

Wire to Manufacturers in carloads	
Bright basic or bessemer	*$3.05
Spring (except Birmingham)	*$3.65
Wire Products to Trade	
Nails and staples	
Standard and cement-coated	†$3.25
Galvanized	††$2.90
Wire, Merchant Quality	
Annealed	§$3.50
Galvanized	§$3.85

(Fob Pittsburgh, Chicago, Cleveland, Birmingham, per base column)

Woven fence, 15½ gage and heavier	72
Barbed wire, 80-rod spool	79
Barbless wire, twisted	79
Fence posts	74
Bale ties, single loop	72½

*Add $0.10 for Worcester, $0.05 for Duluth and $0.50 for Pacific ports.

†Add $0.30 for Worcester, $0.50 for Pacific ports.

††Add $0.50 for Pacific ports.

§Add $0.10 for Worcester, $0.70 for Pacific ports.

Tubular Goods

Welded Pipe: Base price in carloads, threaded and coupled to consumers about $200 per net ton. Base discounts on steel pipe Pittsburgh and Lorain, O.; Gary, Ind., 2 points less on lap weld, 1 point less on butt weld. Pittsburgh base only on wrought iron pipe.

Butt Weld

In.	Steel Blk.	Steel Galv.	In.	Iron Blk.	Iron Galv.
⅛	58	30	½	21	0½
¼ & ⅜	56	37½	¾	27	7
½	60½	48	1-1¼	31	13
⅝	63½	52	1½	35	15½
1-3	65½	54½	2	34½	15

Lap Weld

In.	Steel Blk.	Steel Galv.	In.	Iron Blk.	Iron Galv.
2	58	46½	1¼	20	0½
2½-3	61	49½	1½	25½	7
3½-6	63	51½	2	27½	9
7-8	62	49½	2½-3½	28½	11½
9-10	61½	49	4	30½	15
11-12	60½	48	4½-8	29½	14
			9-12	25½	9

Boiler Tubes: Net base prices per 100 feet fob Pittsburgh in carload lots, minimum wall, cut lengths 4 to 24 feet, inclusive.

O.D. sizes	B.W.G.	—Seamless— Hot Rolled	Cold Drawn	—Elec. Weld— Hot Rolled	Cold Rolled
1"	13	.....	$9.90	$9.36	$9.65
1¼"	13	.....	11.73	9.63	11.43
1½"	13	$10.91	12.96	10.63	12.64
1¾"	13	12.41	14.75	12.10	14.37
2"	13	13.90	16.52	13.53	16.19
2¼"	13	15.50	18.42	15.06	18.03
2¼"	12	17.07	20.28	16.57	19.83
2½"	12	18.70	22.21	18.11	21.68
2¾"	12	19.82	23.54	19.17	22.95
3"	12	20.79	24.71	20.05	24.02
3½"	11	26.24	31.18	25.30	30.29
4"	10	32.56	38.68	31.32	37.52
4½"	9	43.16	51.29	.....	.....
5"	9	49.96	59.36	.....	.....
6"	7	76.71	91.14	.....	.....

Pipe, Cast Iron: Class B, 6-in. and over, $54 per net ton, Birmingham; $59, Burlington, N. J.; $62.80, del., Chicago; 4-in. pipe, $5 higher. Class A pipe, $3 a ton over class B.

Rails, Supplies

Standard rails, over 60-lb, fob mill, net ton, $43.40. Light rails (billet), Pittsburgh, Chicago, Birmingham, net ton, $49.18.

*Relaying rails, 35 lb and over, fob railroad and basing points, $31-$33.

Supplies: Track bolts, 4.75c; heat treated, 5.00c. Tie plates $51 net ton, base. Standard spikes, 3.65c.

*Fixed by OPA Schedule 46, Dec. 15, 1941.

Tool Steels

Tool Steels: Pittsburgh, Bethlehem, Syracuse, Canton, O., Dunkirk, N. Y., base, cents per lb: Reg. carbon 15.15c; extra carbon 19.48c; special carbon 23.80c; oil-hardening 25.97c; high carbon-chromium 46.53c.

W	Cr	V	Mo	Base, per lb.
18.00	4	1	...	72.49c
1.5	4	1	8.5	58.43c
.....	4	2	3	58.45c
6.40	4.15	1.90	5	62.22c
5.50	4.50	4	4.50	75.74c

Rivets

Fob Pittsburgh, Cleveland, Chicago, Birmingham

Structural	3.75c
⅞-inch and under	65-5 off

Washers, Wrought

Fob Pittsburgh, Chicago, Philadelphia, to jobbers and large nut and bolt manufacturers, lcl ..... $2.75-$3.00 off

Bolts, Nuts

Fob Pittsburgh, Cleveland, Birmingham, Chicago. Additional discounts: 5 for carloads; 10 for full containers, except tire, step and plow bolts.

(Ceiling prices advanced 7 per cent, effective Apr. 1, 1946; discounts remain unchanged.)

Carriage and Machine	
½ x 6 and smaller	65½ off
Do., ⅝ and ⅝ x 6-in. and shorter	63½ off
Do., ⅝ to 1 x 6-in. and shorter	61 off
1⅛ and larger, all lengths	59 off
All diameters, over 6-in. long	59 off
Tire bolts	50 off
Step bolts	56 off
Plow bolts	65 off
Stove Bolts	

In packages, nuts separate, 71-10 off, nuts attached, 71 off; bulk, 80 off on 15,000 of 3-in. and shorter, or 5000 over 3 in., nuts separate.

Nuts	U.S.S.	S.A.E.
Semifinished hex		
⅞-in. and smaller	..	64
½-in. and smaller	62	..
½-in.-1-in.	..	60
⅞-in.-1-in.	59	..
1⅛-in.-1½-in.	57	58
1⅝-in. and larger	56	..

Additional discount of 10 for full kegs.

Hexagon Cap Screws	
Upset 1-in., smaller	64 off
Milled 1-in., smaller	60 off
Square Head Set Screws	
Upset 1-in. and smaller	71 off
Headless, ¼-in. and larger	60 off
No. 10 and smaller	70 off

Stainless Steels

(Open market prices. OPA price control suspended Oct. 11, 1945.)

Base, Cents per lb

CHROMIUM NICKEL STEELS

	Bars	Plates	Sheets	H. R. Strip	C. R. Strip
302	25.96c	29.21c	36.79c	23.93c	30.30c
303	28.13	31.38	38.95	29.21	35.71
304	27.05	31.38	38.95	25.45	32.48
308	31.38	36.79	44.36	30.84	37.87
309	38.95	43.28	50.85	40.03	50.85
310	53.02	58.26	57.35	52.74	60.59
312	38.95	43.28	53.02	.....	.....
*316	43.28	47.61	51.94	43.28	51.94
†321	31.38	36.79	44.36	31.65	41.12
†347	35.71	41.12	48.69	35.71	45.44
431	20.56	23.80	31.38	18.94	24.35

STRAIGHT CHROMIUM STEEL

403	23.93	26.51	31.92	22.99	28.21
**410	20.02	23.93	28.67	18.39	23.80
416	20.56	23.80	29.21	19.75	25.45
††420	25.96	30.84	36.25	25.70	33.49
430	20.56	23.80	31.38	18.94	24.35
‡‡430F	21.10	24.35	31.92	20.29	26.51
440A	25.96	30.84	36.25	25.70	33.49
442	24.35	27.59	35.17	25.96	34.62
443	24.35	27.59	35.17	25.96	34.62
446	29.76	33.00	39.49	37.87	56.26
501	8.66	12.98	17.04	12.98	18.39
502	9.74	14.07	18.12	14.07	19.48

STAINLESS CLAD STEEL (20%)

(Fob Pittsburgh and Washington, Pa., plate prices include annealing and pickling.)

304	....	19.48	20.56	....	....
410	....	17.31	18.39	....	....
430	....	17.85	18.94	....	....
446	....	19.48	20.56	....	....

* With 2-3% molybdenum. § With titanium. † With columbium. ** Plus machining agent. †† High carbon. ‡‡ Free machining.

Metallurgical Coke

Price Per Net Ton

Beehive Ovens	
Connellsville, furnace	*7.50
Connellsville, foundry	8.00- 8.50
New River, foundry	9.00- 9.25
Wise county, foundry	7.75- 8.25
Wise county, furnace	7.25- 7.75
By-Product Foundry	
Kearney, N. J., ovens	13.05
Chicago, outside delivered	13.00
Chicago, delivered	13.75
Terre Haute, delivered	13.50
Milwaukee, ovens	13.75
New England, delivered	14.65
St. Louis, delivered	†13.75
Birmingham, delivered	10.90
Indianapolis, delivered	13.50
Cincinnati, delivered	13.25
Cleveland, delivered	13.20
Buffalo, delivered	13.40
Detroit, delivered	13.75
Philadelphia, delivered	18.23

*Operators of hand-drawn ovens using trucked coal may charge $8.00; effective May 26, 1945. †14.25 from other than Ala., Mo., Tenn.

Coke By-Products

Spot, gal, freight allowed east of Omaha	
Pure and 90% benzol	15.00c
Toluol, two degree	27.00c
Solvent naphtha	26.00c
Industrial xylol	26.00c
Per pound fob works	
Phenol (car lots, returnable drums)	10.50c
Do., less than carlots	11.25c
Do., tank cars	9.50c
Eastern plants, per pound	
Naphthalene flakes, balls, bbl, to jobbers	8.00c
Per ton, bulk, fob port	
Sulphate of ammonia	$20.20

WAREHOUSE STEEL PRICES

Base delivered price, cents per pound, for delivery within switching limits, subject to established extras. Quotations based on OPA mill prices announced March 1, 1946. Open market prices designated by dagger.

	Hot-rolled bars	Structural shapes	Plates	Floor plates	Hot-rolled sheets (10-gage base)	Hot-rolled strip (14-gage and lighter, 6-in and narrower)	Hot-rolled strip (12-gage and heavier wider than 6-inch)	Galvanized flat sheets (24-gage base)	Cold-rolled sheets (17-gage base)	Cold finished bars	Cold-rolled strip
Boston	4.294[1]	4.162[1]	4.162[1]	5.977[1]	3.999[1]	5.456[6]	4.356[1]	5.674[16]	4.969[16]	4.594[11]	4.965
New York	4.103[1]	4.008[1]	4.018[1]	5.824[1]	3.815[1]	4.324[1]	4.224[1]	5.460[16]	4.838[16]	4.553[21]	5.024
Jersey City	4.103[1]	3.997[1]	4.018[1]	5.824[1]	3.815[1]	4.324[1]	4.224[1]	5.460[16]	4.838[16]	4.553[21]	5.024
Philadelphia	4.072[1]	3.916[1]	3.855[1]	3.768[1]	3.748[1]	4.622[1]	4.172[1]	5.468[16]	5.097[26]	4.022[21]	5.023
Baltimore	4.052[1]	4.009[1]	3.844[1]	5.502[1]	3.619[1]	4.602[1]	4.152[1]	5.344[1]	5.077[26]	4.502[21]	.....
Washington	4.191[1]	4.180[1]	4.046[1]	5.591[1]	3.821[1]	4.741[1]	4.291[1]	5.646[17]	5.066[26]	4.491[21]	.....
Norfolk, Va.	4.315[1]	4.252[1]	4.221[1]	5.715[1]	3.996[1]	4.865[1]	4.415[1]	5.821[17]	4.490[26]	4.615[21]	.....
Bethlehem, Pa.*	.....	3.70[1]	.....	.....	.....	.....	.....	.....	.....	.....	.....
Claymont, Del.*	.....	.....	3.70[1]	.....	.....	.....	.....	.....	.....	.....	.....
Coatesville, Pa.*	.....	.....	3.70[1]	.....	.....	.....	.....	.....	.....	.....	.....
Buffalo (city)	3.60[1]	3.65[1]	3.88[1]	5.51[1]	3.575[1]	4.169[1]	4.069[1]	5.20[18]	4.625[19]	4.20[21]	4.919
Buffalo (country)	3.50[1]	3.55[1]	3.55[1]	5.15[1]	3.475[1]	3.85[1]	4.060[1]	5.10[18]	4.525[19]	4.10[21]	4.60
Pittsburgh (city)	3.60[1]	3.65[1]	3.65[1]	5.25[1]	3.575[1]	3.95[1]	3.850[1]	5.20[18]	4.625[26]	4.20[21]	4.70
Pittsburgh (country)	3.50[1]	3.55[1]	3.55[1]	5.15[1]	3.475[1]	3.85[1]	3.750[1]	5.10[18]	4.525[26]	4.10[21]	4.60
Cleveland (city)	3.60[1]	3.838[1]	3.65[1]	5.438[1]	3.575[1]	3.95[1]	3.850[1]	5.327[18]	4.625[26]	4.20[21]	4.70
Cleveland (country)	3.50[1]	.....	3.55[1]	.....	3.475[1]	3.85[1]	3.750[1]	.....	4.525[26]	4.10[21]	4.60
Detroit	3.70[1]	3.911[1]	3.859[1]	5.531[1]	3.675[1]	4.050[1]	3.950[1]	5.450[13]	4.725[26]	4.25[13]	4.909
Omaha (city, del.)	4.293[1]	4.343[1]	4.343[1]	5.943[1]	4.018[1]	4.493[1]	4.393[1]	5.965[18]	5.668[26]	4.893[21]	.....
Omaha (country)	4.193[1]	4.243[1]	4.243[1]	5.843[1]	3.918[1]	4.393[1]	4.293[1]	5.865[18]	.....	.....	.....
Cincinnati	3.861[1]	3.941[1]	3.911[1]	5.541[1]	3.650[1]	4.025[1]	3.925[1]	5.275[18]	4.700[26]	4.461[21]	4.961
Youngstown*	.....	.....	.....	.....	.....	.....	.....	4.85[13]	.....	.....	.....
Middletown, O.*	.....	.....	.....	.....	3.475[1]	3.85[1]	3.750[1]	5.10[18]	.....	.....	.....
Chicago (city)	3.75[1]	3.80[1]	3.80[1]	5.40[1]	3.475[1]	3.95[1]	3.850[1]	†5.40[15]	4.425[24]	4.20[21]	4.90
Milwaukee	3.887[1]	3.937[1]	3.937[1]	5.537[1]	3.612[1]	4.087[1]	3.987[1]	5.722[18]	4.562[24]	4.337[21]	5.037
Indianapolis	3.83[1]	3.88[1]	3.88[1]	5.48[1]	3.743[1]	4.118[1]	4.018[1]	5.368[18]	4.793[24]	4.43[21]	5.080
St. Paul	4.01[9]	4.06[9]	4.06[9]	5.66[9]	3.735[9]	4.272[3]	4.172[3]	5.707[18]	4.685[24]	4.811[21]	5.352
St. Louis	3.897[1]	3.947[1]	3.947[1]	5.547[1]	3.622[1]	4.097[13]	3.997[1]	5.622[18]	4.572[24]	4.481[21]	5.181
Memphis, Tenn.	4.265[1]	4.315[1]	4.315[1]	6.03[1]	4.190[1]	4.565[1]	4.465[3]	5.715[18]	5.005[24]	4.78[21]	.....
Birmingham	3.65[1]	3.80[1]	3.80[1]	6.153[1]	3.675[1]	4.05[1]	3.950[1]	5.20[18]	5.077[24]	4.99[21]	5.465
New Orleans (city)	4.35[4]	4.15[4]	4.15[4]	6.10[4]	4.289[4]	4.55[4]	4.450[4]	5.70[18]	5.304[18]	5.05[21]	5.679
Houston, Tex.	4.00[3]	4.50[1]	4.50[1]	5.75[3]	3.988[1]	4.663[3]	4.563[3]	5.768[26]	5.819[18]	4.10[21]	.....
Los Angeles	4.65[4]	4.90[4]	5.20[4]	7.45[4]	5.225[4]	7.10[4]	5.200[4]	6.45[13]	7.425[3]	6.033[23]	5.863
San Francisco	4.40[7]	4.60[7]	4.90[7]	6.60[7]	4.775[7]	6.10[7]	4.750[7]	6.80[18]	7.525[18]	5.783[21]	7.583
Portland, Oreg.	4.70[37]	4.70[37]	5.00[37]	6.75[37]	4.875[37]	6.65[37]	5.000[37]	6.20[18]	6.825[18]	5.983[18]	.....
Tacoma, Wash.	4.60[3]	4.70[3]	5.00[3]	6.75[3]	4.875[3]	5.80[3]	4.500[3]	6.40[18]	7.825[18]	6.233[21]	.....
Seattle	4.70[3]	4.70[3]	5.00[3]	6.75[3]	4.875[3]	5.80[3]	4.500[3]	6.40[18]	7.275[18]	6.233[21]	.....

*Basing point cities with quotations representing mill prices, plus ware house spread.

NOTE—Ceiling prices fixed by Office of Price Administration in revised price schedule No. 49, as amended. Deliveries outside above cities computed in accordance with regulations.

BASE QUANTITIES

[1]—400 to 1999 pounds; [2]—400 to 14,999 pounds; [3]—any quantity; [4]—300 to 1999 pounds; [5]—400 to 8999 pounds; [6]—300 to 9999 pounds; [7]—400 to 39,999 pounds; [8]—under 2000 pounds; [9]—under 4000 pounds; [10]—500 to 1499 pounds; [11]—one bundle to 39,999 pounds; [12]—150 to 2249 pounds; [13]—150 to 1499 pounds; [14]—three to 24 bundles; [15]—450 to 1499 pounds; [16]—one bundle to 1499 pounds; [17]—one to nine bundles; [18]—one to six bundles; [19]—100 to 749 pounds; [20]—300 to 1999 pounds; [21]—1500 to 39,999 pounds; [22]—1500 to 1999 pounds; [23]—1000 to 39,999 pounds; [24]—400 to 1499 pounds; [25]—1000 to 1999 pounds; [26]—under 25 bundles. Cold-rolled strip, 2000 to 39,999 pounds, base; [27]—300 to 4999 pounds.

Ores

Lake Superior Iron Ore

Gross ton, 51½% (Natural) Lower Lake Ports

Old range bessemer	$4.95
Mesabi nonbessemer	4.55
High phosphorus	4.55
Mesabi bessemer	4.70
Old range nonbessemer	4.80

Eastern Local Ore

Cents, units, del. E. Pa.

Foundry and basic 56-63% contract	13.00

Foreign Ore

Cents per unit, cif Atlantic ports

Manganiferous ore, 45-55% Fe, 6-10% Mn	Nom.
N. African low phos.	Nom.
Swedish basic, 60 to 68%	Nom.
Spanish, N. African basic, 50 to 60%	Nom.
Brazil iron ore, 68-69% fob Rio de Janeiro	7.50-8.00

Tungsten Ore

Chinese Wolframite, per short ton unit, duty paid	$24.00

Chrome Ore

(Equivalent OPA schedules):

Gross ton fob cars, New York, Philadelphia, Baltimore, Charleston, S. C., Portland, Oreg., or Tacoma, Wash.

(S S paying for discharge; dry basis, subject to penalties if guarantees are not met.)

Indian and African	
48% 2.8:1	$39.75
48% 3:1	41.00
48% no ratio	31.00
South African (Transvaal)	
44% no ratio	$27.40
45% no ratio	28.30
48% no ratio	31.00
50% no ratio	32.80
Brazilian—nominal	
44% 2.5:1 lump	$33.65
48% 3:1 lump	43.50
Rhodesian	
45% no ratio	$28.30
48% no ratio	31.00
48% 3:1 lump	41.00
Domestic (seller's nearest rail)	
48% 3:1	$43.50

less $7 freight allowance.

Manganese Ore

Sales prices of Office of Metals Reserve, cents per gross ton unit, dry, 48%, at New York, Philadelphia, Baltimore, Norfolk, Mobile and New Orleans, 85c; Fontana, Calif., Provo, Utah, and Pueblo, Colo., 91c; prices include duty on imported ore and are subject to premiums, penalties and other provisions of amended M.P.R. No. 248, effective May 15, 1944. Price at basing points which are also points of discharge of imported manganese ore is fob cars, shipside, at dock most favorable to the buyer. Outside shipments direct to consumers at 10c per unit less than Metal Reserve prices.

Molybdenum

Sulphide conc., lb, Mo cont., mines	$0.75

NATIONAL EMERGENCY STEELS (Hot Rolled)

(Extras for alloy content)

Basic open-hearth Electric furnace

Designation	Carbon	Mn.	Si.	Cr.	Ni.	Mo.	Bars per 100 lb.	Billets per GT	Bars per 100 lb.	Billets per GT
	Chemical Composition Limits, Per Cent									
NE 9415	.13-.18	.80-1.10	.20-.35	.30-.50	.30-.60	.08-.15	$0.780	$15.60	$1.300	$26.00
NE 9425	.23-.28	.80-1.20	.20-.35	.30-.50	.30-.60	.08-.15	.780	15.60	1.300	26.00
NE 9442	.40-.45	1.00-1.30	.20-.35	.30-.50	.30-.60	.08-.15	.832	16.64	1.352	27.04
NE 9722	.20-.25	.50-.80	.20-.35	.10-.25	.40-.70	.15-.25	.676	13.52	1.196	23.92
NE 9912	.10-.15	.50-.70	.20-.35	.40-.60	1.00-1.30	.20-.30	1.248	24.96	1.612	32.24
NE 9920	.18-.23	.50-.70	.20-.35	.40-.60	1.00-1.30	.20-.30	1.248	24.96	1.612	32.24

Extras are in addition to a base price of 2.808c, per pound on finished products and $56.16 per gross ton on semifinished steel major basing points and are in cents per pound and dollars per gross ton. No prices quoted on vanadium alloy.

Pig Iron

Prices (in gross tons) are maximum fixed by OPA Price Schedule No. 10, effective June 10, 1941, amended Feb. 14, Oct. 23, 1945, and March 15, 1946. Exceptions indicated in footnotes. Base prices bold face, delivered light face. Federal tax on freight charges, effective Dec. 1, 1942, not included.

	No. 2 Foundry	Basic	Bessemer	Malleable
Bethlehem, Pa., base	$27.50	$27.00	$28.50	$28.00
Newark, N. J., del.	29.03	28.53	30.03	29.53
Brooklyn, N. Y., del.	30.00	.....	.....	30.50
Birdsboro, Pa., base	27.50	27.00	28.50	28.00
Birmingham, base	22.88	21.50	27.50	.....
Baltimore, del.	28.11	.....	.....	.....
Boston, del.	27.64	.....	.....	.....
Chicago, del.	26.72	.....	.....	.....
Cincinnati, del.	26.94	26.06	.....	.....
Cleveland, del.	26.62	25.74	.....	.....
Newark, N. J.	28.64	.....	.....	.....
Philadelphia, del.	27.96	27.46	.....	.....
St. Louis, del.	26.62	27.54	.....	.....
Buffalo, base	26.50	25.50	27.50	27.00
Boston, del.	28.00	27.00	29.00	28.50
Rochester, del.	28.03	.....	29.03	28.53
Syracuse, del.	28.58	.....	29.58	29.08
Chicago, base	26.50	26.00	27.00	26.50
Milwaukee, del.	27.60	27.10	28.10	27.60
Muskegon, Mich., del.	27.69	.....	.....	27.69
Cleveland, base	26.50	26.00	27.00	26.50
Akron, Canton, del.	27.89	27.39	28.39	27.89
Detroit, base	26.50	26.00	27.00	26.50
Saginaw, Mich., del.	28.81	28.31	29.31	28.81
Duluth, base	27.00	26.50	27.50	27.00
St. Paul, del.	29.13	28.63	29.63	29.13
Erie, Pa., base	26.50	26.00	27.50	27.00
Everett, Mass., base	27.50	27.00	28.50	28.00
Boston, del.	28.00	27.50	29.00	28.50
Granite City, Ill., base	26.50	26.00	27.00	26.50
St. Louis, del.	27.00	26.50	.....	27.00
Hamilton, O., base	26.50	26.00	.....	26.50
Cincinnati, del.	27.61	27.11	.....	27.61
Neville Island, Pa., base	26.50	26.00	27.00	26.50
*Pittsburgh, del. N. & S. sides	27.19	26.69	27.69	27.19
Provo, Utah, base	24.50	24.00	.....	.....
Sharpsville, Pa., base	26.50	26.00	27.00	26.50
Sparrows Point, base	27.50	27.00	.....	.....
Baltimore, del.	28.49	.....	.....	.....
Steelton, Pa., base	.....	27.00	.....	.....
Swedeland, Pa., base	27.50	27.00	28.50	28.00
Philadelphia, del.	28.34	27.84	.....	28.04
Toledo, O., base	26.50	26.00	27.00	26.50
Youngstown, O., base	26.50	26.00	27.00	26.50
Mansfield, O., del.	28.44	27.94	28.94	28.44

*To Neville Island base add: 55 cents for McKees Rocks, Pa.; 84 cents, Lawrenceville, Homestead, McKeesport, Ambridge, Monaco, Aliquippa; 97 cents (water), Monongahela; $1.11, Oakmont, Verona; $1.24, Brackenridge.

Exception to Ceiling Prices: Struthers Iron & Steel Co., Struthers, O., may charge 50 cents a ton in excess of basing point prices for No. 2 foundry, basic, bessemer and malleable pig iron.

Ceiling Prices are aggregate of (1) governing basing point, (2) differentials, and (3) transportation charges from governing basing point to point of delivery as customarily computed. Governing basing point is the one resulting in lowest delivered price for the consumer.

High Silicon, Silvery

6.00-6.50 per cent (base)	$32.00		
6.51-7.00	$33.00	9.01- 9.50	.38.00
7.01-7.50	34.00	9.51-10.00	39.00
7.51-8.00	35.00	10.01-10.50	40.00
8.01-8.50	36.00	10.51-11.00	41.00
8.51-9.00	37.00	11.01-11.50	42.00

Fob Jackson county, O., per gross ton; Buffalo base $1.25 higher. Buyer may use whichever base is more favorable.

Electric Furnace Ferrosilicon: Si 14.01 to 14.50%, $45.50 Jackson co.; each additional 0.50% silicon up to and including 18% add $1; low impurities not exceeding 0.005 P, 0.40 Si, 1.0% C, add $1.

Bessemer Ferrosilicon

Prices same as for high silicon silvery iron, plus $1 per gross ton.

Charcoal Pig Iron

Semi-cold blast, low phosphorus.

Fob furnace, Lyles, Tenn. $33.00 (For higher silicon irons a differential over and above the price of base grade is charged as well as for the hard chilling iron, Nos. 5 and 6.)

Gray Forge

Neville Island, Pa. $26.00
Valley base 26.00

Low Phosphorus

Basing points: Birdsboro, Pa., Steelton, Pa., and Buffalo, N. Y., $32.00 base; $33.24, del. Philadelphia. Intermediate phosphorus, Central Furnace, Cleveland, $29.00.

Differentials

Basing point prices are subject to following differentials:

Silicon: An additional charge not to exceed 50 cents a ton for each 0.25 per cent silicon in excess of base grade (1.75% to 2.25%).

Phosphorus: A reduction of 38 cents a ton for phosphorus content of 0.70 per cent and over.

Manganese: An additional charge not to exceed 50 cents a ton for each 0.50 per cent, or portion thereof, manganese in excess of 1%.

Nickel: An additional charge for nickel content as follows: Under 0.50%, no extra; 0.50% to 0.74%, inclusive, $2 a ton; for each additional 0.25% nickel, $1 a ton.

Refractories

Per 1000 pieces, fob shipping point. Net prices

Fire Clay Brick

Super Duty

Pa., Mo., Ky. $76.05

High Heat Duty

Pa., Ill., O., Md., Mo., Ky. 60.40
Ala., Ga. 60.40
N. J. 65.90

Intermediate Heat Duty

Ohio 50.60
Pa., Ill., Md., Mo., Ky. 54.80
Ala., Ga. 49.15
N. J. 54.80

Low Heat Duty

Pa., Md., Ohio 42.35

Malleable Bung Brick

All bases 70.45

Ladle Brick

(Pa., O., W. Va., Mo.)

Dry Press 36.45
Wire Cut 34.15

Silica Brick

Pennsylvania 60.40
Joliet, E. Chicago 69.30
Birmingham, Ala. 60.40

Magnesite

Domestic dead-burned grains, net ton fob Chewelah, Wash., net ton, bulk 22.00
net ton, bags 26.00

Basic Brick

Net ton, fob Baltimore, Plymouth Meeting, Chester, Pa.

Chrome brick 54.00
Chem. bonded chrome 54.00
Magnesite brick 76.00
Chem. bonded magnesite 65.00

Fluorspar

Metallurgical grade, fob Ill., Ky., net tons, carloads, CaF_2 content, 70% or more, $33; 65 but less than 70%, $32; 60 but less than 65% $31; less than 60%, $30. After Aug. 29, 1944, base price any grade $30.00.

Ferroalloy Prices

Ferromanganese, standard: 78-82% c.l. gross ton, duty paid, $135 fob cars, Baltimore, Philadelphia or New York, whichever is most favorable to buyer, Rockdale or Rockwood, Tenn. (where Tennessee Products Co. is producer), Birmingham, Ala. (where Sloss-Sheffield Steel & Iron Co. is producer); $140 fob cars, Pittsburgh (where Carnegie-Illinois Steel Corp. is producer); add $6 for packed c.l., $10 for ton, $13.50 for less ton; $1.70 for each 1%, or fraction contained manganese over 82% or under 78%.

Ferromanganese, low carbon: Eastern zone: Special, 21c; regular, 20.50c; medium, 14.50c; central zone: Special, 21.30c; regular, 20.80c; medium, 14.80c; western zone: Special, 21.55c; regular, 21.05c; medium, 15.75c. Prices are per pound contained Mn, bulk carlot shipments, fob shipping point, freight allowed. Special low-carbon has content of 90% Mn, 0.10% C, and 0.06% P.

Spiegeleisen: 19-21% carlot per gross ton, Palmerton, Pa., $36; Pittsburgh, $40.50; Chicago, $40.60.

Electrolytic Manganese: 99.9% plus, less ton lots, per lb 37.6c.

Chromium Metal: 97% min. chromium, max. 0.50% carbon, eastern zone, per lb contained chromium bulk, c.l., 79.50c, 2000 lb to c.l. 80c; central 81c and 82.50c; western 82.25c and 84.75c; fob shipping point, freight allowed.

Ferrocolumbium: 50-60% per lb contained columbium in gross ton lots, contract basis, R. R. freight allowed, eastern zone, $2.25; less-ton lots $2.30. Spot prices 10 cents per lb higher.

Ferrochrome: High carbon, eastern zone, bulk, c.l., 13c, 2000 lb. to c.l. 13.90c; central, add .40c and .65c; western, add 1c and 1.85c—high nitrogen, high carbon ferrochrome; Add 5c to all high carbon ferrochrome prices; all zones; low carbon eastern, bulk, c.l. max. 0.06% carbon, 23c, 0.10% 22.50c, 0.15% 22c, 0.20% 21.50c, 0.50% 21c, 1.00% 20.50c, 2.00% 19.50c; 2000 lb to c.l., 0.06% 24c, 0.10% 23.50c, 0.15% 23c, 2.00% 22.50c, 0.50% 22c, 1.00% 21.50c, 2.00% 20.50c; central, add 0.4c for bulk, c.l. and 0.65 for 2000 lb to c.l.; western, add 1c for bulk, c.l. and 1.85c for 2000 lb c.l.; carload packed differential 0.45c; fob shipping point, freight allowed. Prices per lb contained Cr, high nitrogen, low carbon ferrochrome: Add 2c to low carbon ferrochrome prices; all zones. For higher nitrogen carbon add 2c for each 0.25% of nitrogen over 0.75%.

Special Foundry Ferrochrome: (Cr 62-66%; C approx. 5-7%.) Contract, carload bulk 13.50c, packed 13.95c, ton lots 14.40c, less 14.90c, eastern, freight allowed, per pound contained chromium; 13.90c, 14.35c, 15.05c and 15.55c central; 14.50c, 14.95c, 16.25c and 16.75c, western; spot up .25c.

S.M. Ferrochrome, high carbon: (Cr 60-65%, Si 4-6%, Mn 4-6% and C 4-6%.) Contract, carlot, bulk, 14.00c, packed 14.45c, ton lots 14.90c, less 15.40c, eastern, freight allowed; 14.40c, 14.85c, 15.55c and 16.05c, central; 15.00c, 15.45c, 16.75c and 17.25c, western; spot up .25c; per pound contained chromium.

S.M. Ferrochrome, low carbon: (Cr 62-66%, Si 4-6%, Mn 4-6% and C 1.25% max.) Contract, carlot, bulk, 20.00c, packed 20.45c, ton lots 21.00c, less ton lots 22.00c, eastern, freight allowed, per pound contained chromium; 20.40c, 20.85c, 21.65c and 22.65c, central; 21.00c, 21.45c, 22.85c and 23.85c, western; spot up .25c.

SMZ Alloy: (Si 60-65%, Mn 5-7%, Zr 5-7% and Fe approx. 20%) per lb of alloy contract carlots 11.50c, ton lots 12.00c, less 12.50c, eastern zone, freight allowed; 12.00c, 12.85c and 13.35c central zone; 14.05c, 14.60c and 15.10c, western; spot up .25c.

Silicaz Alloy: (Si 35-40%, Ca 9-11%, Al 5-7%, Zr 5-7%, Ti 9-11% and B 0.55-0.75%), per lb of alloy contract, carlots 25.00c, ton lots 26.00c, less ton lots 27.00c, eastern, freight allowed, 25.50c, 26.75c and 27.75c, central; 27.50c, 28.90c and 29.90c, western; spot up .25c.

Silvaz Alloy: (Si 35-40%, Va 9-11%, Al 5-7%, Zr 5-7%, Ti 9-11% and B 0.55-0.75%) per lb of alloy. Contract, carlots 58.00c, ton lots 59.00c, less 60.00c, eastern freight allowed; 58.50c, 59.75c and 60.75c, central; 60.50c, 61.90c and 62.90c, western; spot up ¼c.

CMSZ Alloy 4: (Cr 45-49%, Mn 4-6%, Si 18-21%, Zr 1.25-1.75% and C 3.00-4.50%). Contract carlots, bulk, 11.00c and packed 11.50c; ton lots 12.00c; less 12.50c, eastern, freight allowed; 11.50c and 12.00c, 12.75c, 13.25c, central; 13.50c and 14.00c, 14.75c, 15.25c, western; spot up .25c.

CMSZ Alloy 5: (Cr 50-56%, Mn 4-6%, Si 13.50-16.00%, Zr 0.75-1.25%, C 3.50-5.00%) per lb of alloy. Contract, carlots, bulk, 10.75c, packed 11.25c, ton lots 11.75c, less 12.25c, eastern, freight allowed; 11.25c, 11.75c, 12.50c, 13.00c central; 13.25c, 13.75c, 14.50c and 15.00c, western; spot up 0.25c.

Ferro-Boron: (B 17.50% min., Si 1.50% max., Al 0.50% max. and C 0.50% max.) per lb of alloy contract ton lots $1.20, less ton lots $1.30, eastern, freight allowed; $1.2075 and $1.3075 central; $1.229 and $1.329, western; spot add 5c.

Manganese-Boron: (Mn 75% approx., B 15-20%, Fe 5% max., Si 1.50% max. and C 3% max.) per lb of alloy. Contract ton lots, $1.89 less $2.01, eastern; freight allowed; $1.903 and $2.023, central; $1.935 and $2.055 western; spot up 5c.

Nickel-Boron: (B 15-18%, Al 1% max., Si 1.50% max., C 0.50% max., Fe 3% max., Ni, balance), per lb of alloy. Contract, 5 tons or more $1.90, 1 ton to 8 tons, $2.00, less than ton $2.10, eastern, freight allowed; $1.9125, $2.0125 and $2.1125, central; $1.9445, $2.0445 and $2.1445, western; spot same as contract.

Chromium-Copper: (Cr 8-11%, Cu 88-90%, Fe 1% max., Si 0.50% max.) contract, any quantity, 45c, eastern, Niagara Falls, N. Y., basis, freight allowed to destination, except to points taking rate in excess of St. Louis rate to which equivalent of St. Louis rate will be allowed; spot up 2c.

Vanadium Oxide: (Fused: Vanadium oxide 85-88%, sodium oxide approx. 10% and calcium oxide approx. 2%, or Red Cake; Vanadium oxide 85% approx., sodium oxide, approx. 9% and water approx.

2.5%) Contract, any quantity, $1.10 eastern, freight allowed per pound vanadium oxide contained; contract carlots, $1.105, less carlots, $1.108, central; $1.118 and $1.133, western; spot add 5c to contracts in all cases.

Calcium metal; cast: Contract ton lots or more $1.35, less, $1.60, pound of metal; $1.36 and $1.61 central, $1.40 and $1.65, western; spot up 5c.

Calcium-Manganese-Silicon: (Ca 16-20%, Mn 14-18% and Si 53-59%), per lb of alloy. Contract, carlots, 15.50c, ton lots 16.50c and less 17.00c, eastern, freight allowed; 16.00c, 17.35c, and 17.85c, central; 18.05c, 19.10c and 19.60c western; spot up 0.25c.

Calcium-Silicon: (Ca 30-35%, Si 60-65% and Fe 3.00% max.), per lb of alloy. Contract, carlot, lump 13.00c, ton lots 14.50c, less 15.50c, eastern, freight allowed; 13.50c, 15.25c and 16.25c ecntral; 15.55c, 17.40c and 18.40c, western; spot up 0.25c.

Briquets, Ferromanganese: (Weight approx. 3 lb and containing exactly 2 lb Mn) per lb of briquets. Contract, carlots, bulk 0.0605c, packed 0.063c, tons 0.0655c, less 0.068c eastern freight allowed; 0.063c, 0.655c, 0.0755c and 0.078c, central; 0.066c, 0.0685c, 0.0855c and 0.088c, western; spot up 0.25c.

Briquets, Ferrochrome: Containing exactly 2 lb Cr, eastern zone, bulk, c.l., 8.25c per lb of briquets, 2000 lb to c.l., 8.75c; central, add 0.3c for c.l. and 0.5c for 2000 lb to c.l.; western add 0.70c for c.l., and 0.2c for 2000 lb to c.l.; **silicomanganese,** eastern, containing exactly 2 lb Mn and approx. ½ lb Si, bulk, c.l., 5.80c, 2000 lb to c.l., 6.35c; central add 0.25c for c.l. and 1c for 2000 lb to c.l.; western, add 0.55c for c.l., and 0.2c for 2000 lb to c.l.; **ferrosilicon, eastern,** approx. 5 lb, containing exactly 2 lb Si, or weighing approx. 2½ lb and containing exactly 1 lb of Si, bulk, c.l. 3.35c, 2000 lb to c.l., 3.80c; central, add 0.15c for c.l., and 0.40c for 2000 lb to c.l.; western, add 0.30c for c.l. and 0.45c for 2000 to c.l.; fob shipping point, freight allowed.

Ferromolybdenum: 55-75% per lb contained Mo, fob Langeloth and Washington, Pa., furnace, any quantity 95.00c.

Ferrophosphorus: 17-19%, based on 18% P content, with unitage of $3 for each 1% of P above or below the base; gross tons per carload fob sellers' works, with freight equalized with Rockdale, Tenn.; contract price $58.50, spot $62.25.

Ferrosilicon: Eastern zone, 90-95%, blk, c.l., 11.05c, 2000 lb to c.l., 12.30c; 80-90%, bulk c.l., 8.90c, 2000 lb to c.l., 9.95c; 75%, bulk, c.l., 8.05c, 2000 lb to c.l., 9.05c; 50%, bulk c.l., 6.65c and 2000 lb to c.l., 7.85c; central 90-95%, bulk, c.l., 11.20c, 2000 lb to c.l., 12.80c; 80-90%, bulk, c.l., 9.05c, 2000 to c.l., 10.45c; 75%, bulk, c.l., 8.20c, 2000 lb to c.l., 9.65c; 50% bulk, c.l., 7.10c, 2000 lb to c.l., 9.70c; western, 90-95%, bulk, c.l., 11.65c, 2000 lb to c.l., 15.60c; 80-90%, bulk, c.l., 9.55c, 2000 lb to c.l., 13.50c; 75%, bulk, c.l., 8.75c, 2000 lb to c.l., 13.10c; 50%, bulk, c.l., 7.25c, 2000 lb to c.l., 8.75c; fob shipping point, freight allowed. Prices per lb contained Si.

Grainal: Vanadium Grainal No. 1 87.5c; No. 6, 60c; No. 79, 45c; all fob Bridgeville, Pa., usual freight allowance.

Silicon Metal: Min. 97% Si and max. 1% Fe, eastern zone, bulk, c.l., 12.90c; 2000 lb to c.l., 13.45c; central, 13.20c and 13.90c; western, 13.85c and 16.80c; min. 96% Si and max. 2% Fe, eastern, bulk, c.l., 12.50c, 2000 lb to c.l., 13.10c; central, 12.80c and 13.55c; western, 13.45c and 16.50c fob shipping point, freight allowed. Price per lb contained Si.

Manganese Metal: (96% min. Mn, max. 2% Fe), per lb of metal, eastern zone, bulk, c.l., 30c, 2000 lb to c.l., 32c, central, 30.25c, and 33c; western, 30.55c and 35.05c.

Ferrotungsten: Spot, 10,000 lb or more, per lb contained W, $1.90; contract, $1.88; freight allowed as far west as St. Louis.

Tungsten Metal Powder: Spot, not less than 97%, $2.50-$2.60; freight allowed as far west as St. Louis.

Ferrotitanium: 40-45%, R.R. freight allowed, per lb contained Ti; ton lots $1.23; less-ton lots $1.25; eastern. Spot up 5c per lb.

Ferrotitanium: 20-25%, 0.10 maximum carbon; per lb contained Ti; ton lots $1.35; less-ton lots $1.40 eastern. Spot up 5c per lb.

High-Carbon Ferrotitanium: 15-20% contract basis, per net ton, fob Niagara Falls, N. Y., freight allowed to destination east of Mississippi river and north of Baltimore and St. Louis, 6.8% C $142.50; 3-5% C $157.50.

Carbortam: B 0.90 to 1.15% net ton to carload, 8c per lb fob Suspension Bridge, N. Y., freight allowed same as high-carbon ferrotitanium.

Bortam: B 1.5-1.9%, ton lots, 45c lb; less-ton lots, 50c lb.

Ferrovanadium: Va 35-55%, contract basis, per lb contained Va, fob producers plant with usual freight allowances; open-hearth grade $2.70; special grade $2.80; highly-special grade $2.90.

Zirconium Alloys: Zr 12-15%, per lb of alloy, eastern contract, carlots, bulk, 4.60c, packed 4.80c, ton lots 4.80c, less tons 5c, carloads, bulk, per gross ton $102.50; packed $107.50; ton lots $108; less-ton lots $112.50. Spot up ¼c per ton.

Zirconium Alloy: Zr 35-40%, eastern, contract basis, carloads in bulk or package, per lb of alloy 14.00c; gross ton lots 15.00c; less-ton lots 16.00c. Spot up ¼c.

Alsifer: (Approx. 20% Al, 40% Si, 40% Fe) contract basis fob Niagara Falls, N. Y., lump, per lb 5.50c; ton lots 6.00c. Spot up ½c.

Siminal: (Approx. 20% each Si, Mn, Al) Contract, freight not exceeding St. Louis rate allowed, per lb alloy; carlots 8c; ton lots 8.75c; less-ton lots 9.25c.

Borosil: 3 to 4% B, 40 to 45% Si, $6.25 lb contained B, fob Philo, O., freight not exceeding St. Louis rate allowed.

OPEN MARKET PRICES, IRON AND STEEL SCRAP

Following prices are quotations developed by editors of STEEL in the various centers. For complete OPA ceiling price schedule refer to maximum price regulation No. 4 Quotations are on gross tons.

PHILADELPHIA:
(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$18.75
No. 2 Heavy Melt. Steel	18.75
No. 2 Bundles	18.75
No. 3 Bundles	16.75
Mixed Borings, Turnings	13.75
Machine Shop Turnings	13.75
Billet, Forge Crops	23.75
Bar Crops, Plate Scrap	21.25
Cast Steel	21.25
Punchings	21.25
Elec. Furnace Bundles	19.75
Heavy Turnings	18.25

Cast Grades
(Fob Shipping Point)

Heavy Breakable Cast	16.50
Charging Box Cast	19.00
Cupola Cast	20.00
Unstripped Motor Blocks	17.50
Malleable	22.00
Chemical Borings	16.51

NEW YORK:
(Dealers' buying prices)

No. 1 Heavy Melt. Steel	$15.33
No. 2 Heavy Melt. Steel	15.33
No. 2 Hyd. Bundles	15.33
No. 3 Hyd. Bundles	13.33
Chemical Borings	14.33
Machine Turnings	10.33
Mixed Borings, Turnings	10.33
No. 1 Cupola	20.00
Charging Box	19.00
Heavy Breakable	16.50
Unstripped Motor Blocks	17.50
Stove Plate	19.00

BOSTON:
(Fob shipping points. Boston differential 99c higher, steelmaking grades; Providence, $1.09 higher)

No. 1 Heavy Melt. Steel	$14.06
No. 2 Heavy Melt. Steel	14.06
No. 1 Bundles	14.06
No. 2 Bundles	14.06
No. 1 Busheling	14.06
Machine Shop Turnings	9.06
Mixed Borings, Turnings	9.06
Short Shovel Turnings	11.06
Chemical Borings	13.31
Low Phos. Clippings	16.56
No. 1 Cast	20.00
Clean Auto Cast	20.00
Stove Plate	19.00
Heavy Breakable Cast	16.50

BUFFALO:
(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$19.25
No. 2 Heavy Melt. Steel	19.25
No. 1 Bundles	19.25
No. 2 Bundles	19.25
No. 1 Busheling	19.25
Machine Turnings	14.25
Short Shovel Turnings	16.25
Mixed Borings, Turn.	14.25
Cast Iron Borings	15.25
Low Phos.	21.75

PITTSBURGH:
(Delivered consumer's plant)

Railroad Heavy Melting	$21.00
No. 1 Heavy Melt. Steel	20.00
No. 2 Heavy Melt. Steel	20.00
No. 1 Comp. Bundles	20.00
No. 2 Comp. Bundles	20.00
Short Shovel Turnings	17.00
Mach. Shop Turnings	15.00
Mixed Borings, Turnings	15.00
No. 1 Cupola Cast	*20.00
Heavy Breakable Cast	*16.50
Cast Iron Borings	16.00
Billet, Bloom Crops	25.00
Sheet Bar Crops	22.50
Plate Scrap, Punchings	22.50
Railroad Specialties	24.50
Scrap Rail	21.50
Axles	26.00
Rail 3 ft. and under	23.50
Railroad Malleable	22.00

*Shipping point.

CLEVELAND:
(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$19.50
No. 2 Heavy Melt. Steel	19.50
No. 1 Comp. Bundles	19.50
No. 2 Comp. Bundles	19.50
No. 1 Busheling	19.50
Mach. Shop Turnings	14.50
Short Shovel Turnings	16.50
Mixed Borings, Turnings	14.50
No. 1 Cupola Cast	20.00
Heavy Breakable Cast	16.50
Cast Iron Borings	13.50-14.00
Billet, Bloom Crops	24.50
Sheet Bar Crops	22.00
Plate Scrap, Punchings	22.00
Elec. Furnace Bundles	20.50

VALLEY:
(Delivered consumer's plant)

No. 1 R.R. Heavy Melt.	$21.00
No. 1 Heavy Melt Steel	20.00
No. 1 Comp. Bundles	20.00
Short Shovel Turnings	17.00
Cast Iron Borings	16.00
Machine Shop Turnings	15.00
Low Phos. Plate	22.50

MANSFIELD:
(Delivered consumer's plant)

Machine Shop Turnings	$15.00

CINCINNATI:
(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$19.50
No. 2 Heavy Melt. Steel	19.50
No. 1 Comp. Bundles	19.50
No. 2 Comp. Bundles	19.50
Machine Turnings	10.50-11.00
Shoveling Turnings	12.50-13.00
Cast Iron Borings	11.50-12.00
Mixed Borings, Turnings	10.50-11.00
No. 1 Cupola Cast	20.00
Breakable Cast	16.50
Low Phosphorus	21.00-22.00
Scrap Rails	20.50-21.00
Stove Plate	18.50-19.00

DETROIT:
(Delivered consumer's plant)

Heavy Melting Steel	$17.32
No. 1 Busheling	17.32
Hydraulic Bundles	17.32
Flashings	17.32
Machine Turnings	12.32
Short Shovel, Turnings	14.32
Cast Iron Borings	13.32
Low Phos. Plate	19.82
No. 1 Cast	20.00
Heavy Breakable Cast	16.50

CHICAGO:
(Delivered consumer's plant; cast grades fob shipping point; railroad grades fob tracks)

No. 1 R.R. Heavy Melt.	$19.75
No. 1 Heavy Melt. Steel	18.75
No. 2 Heavy Melt. Steel	18.75
No. 1 Ind. Bundles	18.75
No. 2 Dlr. Bundles	18.75
Baled Mach. Shop Turn.	18.75
No. 3 Galv. Bundles	16.75
Machine Turnings	13.75
Mix. Borings, Sht. Turn.	13.75
Short Shovel Turnings	15.75
Cast Iron Borings	14.75
Scrap Rails	20.25
Cut Rails, 3 feet	22.25
Cut Rails, 18-inch	23.50
Rerolling Rails	22.25
Angles, Splice Bars	22.25
Plate Scrap, Punchings	21.25
Railroad Specialties	22.75
No. 1 Cast	20.00
R.R. Malleable	22.00

ST. LOUIS:
(Delivered consumer's plant; cast grades fob shipping point)

Heavy Melting	$17.50
No. 1 Locomotive Tires	21.00
Misc. Rails	19.00
Railroad Springs	22.00
Bundled Sheets	17.50
Axle Turnings	17.00
Machine Turnings	10.50
Shoveling Turnings	12.50
Rerolling Rails	21.00
Street Car Axles	24.50
Steel Rails, 3 ft.	21.50
Steel Angle Bars	21.00
Cast Iron Wheels	20.00
No. 1 Machinery Cast	20.00
Railroad Malleable	22.00
Breakable Cast	16.50
Stove Plate	19.00
Grate Bars	15.25
Brake Shoes	15.25

BIRMINGHAM:
(Delivered consumer's plant)

Billet Forge Crops	$22.50
Structural, Plate Scrap	19.00
Scrap Rails Random	18.50
Rerolling Rails	20.50
Angle Splice Bars	20.50
Solid Steel Axles	24.00
Cupola Cast	20.00
Stove Plate	19.00
Long Turnings	11.00
Cast Iron Borings	13.00
Iron Car Wheels	20.00

LOS ANGELES:
(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$14.00
No. 2 Heavy Melt. Steel	13.00
No. 1, 2 Dlr. Bundles	12.00
Machine Turnings	5.50
Mixed Borings, Turnings	5.50
No. 1 Cast	20.00

SAN FRANCISCO:
(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$15.00
No. 2 Heavy Melt. Steel	14.00
No. 1 Busheling	15.50
No. 1, No. 2 Bundles	13.00
No. 3 Bundles	8.50
Machine Turnings	7.00
Billet, Forge Crops	15.50
Bar Crops, Plate	15.50
Cast Steel	15.50
Cut, Structural, Plate, 1 ft and under	18.00
Alloy-free Turnings	7.00
Tin Can Bundles	14.50
No. 2 Steel Wheels	15.50
Iron, Steel Axles	23.00
No. 2 Cast Steel	15.50
Uncut Frogs, Switches	15.50
Scrap Rails	15.00
Locomotive Tires	15.50

SEATTLE:
(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$14.12
No. 2 Heavy Melt. Steel	14.12
Heavy Railroad Scrap	14.50
(Fob shipping point)	
No. 1 Cupola Cast	20.00

NONFERROUS METAL PRICES

Copper: Electrolytic or Lake from producers in carlots 12.00c, Del. Conn., less carlots 12.12½c, refinery; dealers may add ¾c for 5000 lbs. to carload; 1000-4999 lbs. 1c; 500-999 1½c; 0-499 2c. Casting, 11.75c, refinery for 20,000 lbs., or more; 12.00c less than 20,000 lbs.

Brass Ingot: Carlot prices, including 25 cents per hundred freight allowance; add ¼c for less than 20 tons; 85-5-5-5 (No. 115) 13.00c; 88-10-2 (No. 215) 16.50c; 80-10-10 (No. 305) 15.75c; No. 1 yellow (No. 405) 10.00c.

Zinc: Prime western 8.25c, select 8.35c, brass special 8.50c, intermediate 8.75c, E. St. Louis, for carlots. For 20,000 lbs. to carlots add 0.15c; 10,000-20,000 0.25c; 2000-10,000 0.40c; under 2000 0.50c.

Lead: Common 6.35c, chemical, 6.45c, corroding, 6.45, E. St. Louis for carloads; add 5 points for Chicago, Minneapolis-St. Paul, Milwaukee-Kenosha districts; add 15 points for Cleveland-Akron-Detroit area, New Jersey, New York state, Texas, Pacific Coast, Richmond, Indianapolis-Kokomo; add 20 points for Birmingham, Connecticut, Boston-Worcester, Springfield, New Hampshire, Rhode Island.

Primary Aluminum: 99% plus, ingots 15.00c del., pigs 14.00c del.; metallurgical 94% min. 13.50c del. Base 10,000 lb and over; add ½c 2000-9999 lb; 1c less through 2000 lb.

Secondary Aluminum: Piston alloy (No. 122 type) 10.50-11.00c; No. 12 foundry alloy (No. 2 grade) 10.50-10.75c; steel deoxidizing grades, notch bars, granulated or shot: Grade 1 (95-97½%) 11.75-12.00c; grade 2 (92-95%) 10.25-10.75c; grade 3 (90-92%) 8.50-9.00c; grade 4 (85-90%) 8.25-8.50c. Above prices for 30,000 lb or more; add ¼c 10,000-30,000 lb; ½c 1000-10,000 lb; 1c less than 1000 lb. Prices include freight at carload rate up to 75c per 100 lb.

Magnesium: Commercially pure (99.8%) standard ingots (4-notch, 17 lb) 20.50c per lb, carlots; 22.50c 100 lb to c.l. Extruded 12-in. sticks 27.50c, carlots; 29.50c 100 lb to c.l.

Tin: Prices ex-dock, New York in 5-ton lots. Add 1 cent for 2240-11,199 lbs., 1½c 1000-2239. 2½c 500-999, 3c under 500. Grade A, 99.8% or higher (includes Straits), 52.00c; Grade B, 99.8% or higher, not meeting specifications for Grade A, with 0.05 per cent maximum arsenic, 51.87½c; Grade C, 99.65-99.79% incl. 51.62½c; Grade D, 99.50-99.64% incl., 51.50c; Grade E, 99-99.49% incl. 51.12½c; Grade F, below 99% (for tin content), 51.00c.

Antimony: American bulk carlots fob Laredo, Tex., 99.0% to 99.8% and 99.8% and over but not meeting specifications below, 14.50c; 99.8% and over (arsenic, 0.05%, max. and other impurities, 0.1%, max.) 15.00c. On producers' sales add ¼c for less than carload to 10,000 lb.; ½c for 9999-224 lb.; and 2c for 223 lb. and less; on sales by dealers, distributors and jobbers add ½c, 1c, and 3c, respectively.

Nickel: Electrolytic cathodes, 99.5%, fob refinery 35.00c lb.; pig and shot produced from electrolytic cathodes 36.00c; "F" nickel shot or ingot for additions to cast iron, 34.00c.

Mercury: Open market, spot, New York, $103-$107 per 76-lb flask.

Arsenic: Prime, white, 99%, carlots, 4.00c lb.

Beryllium-Copper: 3.75-4.25% Be., $14.75 lb contained Be.

Cadmium: Bars, ingots, pencils, pigs, plates, rods, slabs, sticks, and all other "regular" straight or flat forms 90.00c lb., del.; anodes, balls, discs and all other special or patented shapes 95.00c lb. del.

Cobalt: 97-99%, $1.50 lb., for 550 lb. (bbl.); $1.52 lb. for 100 lb. (case); $1.57 lb. under 100 lb.

Indium: 99.9%, $2.25 per troy ounce.

Gold: U. S. Treasury, $35 per ounce.

Silver: Open market, N. Y. 70.625c per ounce.

Platinum: $35 per ounce.

Palladium: $24 per troy ounce.

Iridium: $165 per troy ounce.

Rolled, Drawn, Extruded Products

(Copper and brass product prices based on 12.00c, Conn., for copper. Freight prepaid on 100 lb or more.)

Sheet: Copper 22.08c; yellow brass 20.81c; commercial bronze, 90% 22.40c, 95% 22.61c; red brass, 80% 21.48c, 85% 21.69c; phosphor bronze, grades A and B 5%, 38.77c; Everdur, Herculoy, Duronze or equiv., 27.33c; naval brass 25.83c; manganese bronze 29.33c; muntz metal 24.08c; nickel silver 5% 28.62c.

Rods: Copper, hot-rolled 18.60c, cold-drawn 19.60c; yellow brass 16.04c; commercial bronze 90% 22.35c, 95% 22.56c; red brass 80% 21.43c, 85% 21.64c; phosphor bronze grades A and B 5% 39.02c; Everdur, Herculoy, Duronze or equiv., 26.53c; naval brass 20.15c; manganese bronze 23.53c; muntz metal 19.90c; nickel silver 5% 30.87c.

Seamless Tubing: Copper 22.42c; yellow brass 23.55c; commercial bronze 90% 24.79c; red brass 80% 24.12c, 85% 24.33c.

Extruded Shapes: Copper 22.10c; architectural bronze 20.15c; manganese bronze 25.03c; muntz metal 21.15c; naval brass 21.40c.

Angles and Channels: Yellow brass 29.31c; commercial bronze 90% 30.90c, 95% 31.11c; red brass 80% 29.98c, 85% 30.19c.

Copper Wire: Soft, fob eastern mills, carlots 15.37½c, less-carlots 15.87½c; weatherproof, fob eastern mills, carlots 17.00c, less-carlots 17.50c; magnet, delivered carlots 17.50c, 15,000 lb or more 17.75c, less carlots 18.25c.

Aluminum Sheets and Circles: 2s and 3s flat mill finish, base 30,000 lbs. or more; del.; sheet widths as indicated; circle diameter 9" and larger:

Gage	Width	Sheets	Circles
.249"-7	12"-48"	22.70c	25.20c
8-10	12"-48"	23.20c	25.70c
11-12	26"-48"	24.20c	27.00c
13-14	26"-48"	25.20c	28.50c
15-16	26"-48	26.40c	30.40c
17-18	26"-48"	27.90c	32.90c
19-20	24"-42"	29.80c	35.80c
21-22	24"-42"	31.70c	37.20c
23-24	3"-24"	25.60c	29.20c

Lead Products: Prices to jobbers; full sheets 9.50c; cut sheets 9.75c; pipe 8.15c, New York; 8.25c, Philadelphia, Baltimore, Rochester and Buffalo; 8.75c, Chicago, Cleveland, Worcester, Boston.

Zinc Products: Sheet fob mill, 13.15c; 36,000 lbs. and over deduct 7%; Ribbon and strip 12.25c, 3000-lb. lots deduct 1%, 6000 lbs. 2%, 9000 lbs. 3%, 18,000 lbs. 4%, carloads and over 7%. Boiler plate (not over 12") 3 tons and over 11.00c; 1-3 tons 12.00c; 500-2000 lbs. 12.50c; 100-500 lbs. 13.00c; under 100 lbs. 14.00c. Hull plate (over 12") add 1c to boiler plate prices.

PLATING MATERIALS

Chromic Acid: 99.75%, flake, del., carloads 16.25c; 5 tons and over 16.75c; 1-5 tons 17.25c; 400 lbs. to 1 ton 17.75c; under 400 lbs. 18.25c.

Copper Anodes: Base 2000-5000 lbs., del.; oval 17.62c; untrimmed 18.12c; electro-deposited 17.37c.

Copper Carbonate: 52-54% metallic cu, 250 lb. barrels 20.50c.

Copper Cyanide: 70-71% cu, 100-lb. kegs or bbls. 34.00c fob Niagara Falls.

Sodium Cyanide: 96%, 200-lb. drums 15.00c; 10,000-lb. lots 13.00c fob Niagara Falls.

Nickel Anodes: 500-2999 lb. lots; cast and rolled carbonized 47.00c; rolled depolarized 48.00c.

Nickel Chloride: 100-lb. kegs or 275-lb. bbls. 18.00c lb., del.

Tin Anodes: 1000 lbs. and over 58.50c del.; 500-999 59.00c; 200-499 59.50c; 100-199 61.00c.

Tin Crystals: 400 lb. bbls. 39.00c fob Grasselli, N. J.; 100-lb. kegs 39.50c.

Sodium Stannate: 100 or 300-lb. drums 36.50c, del.; ton lots 35.50c.

Zinc Cyanide: 100-lb. kegs or bbls. 33.00c fob Niagara Falls.

Scrap Metals

Brass Mill Allowances: Prices for less than 15,000 lbs. fob shipping point. Add ⅝c for 15,000-40,000 lbs.; 1c for 40,000 or more.

	Clean Heavy	Rod Ends	Clean Turnings
Copper	10.250	10.250	9.500
Tinned Copper	9.625	9.625	9.375
Yellow Brass	8.625	8.375	7.785
Commercial bronze			
90%	9.375	9.125	8.625
95%	9.500	9.250	8.750
Red Brass, 85%	9.125	8.875	8.375
Red Brass, 80%	9.125	8.875	8.375
Muntz Metal	8.000	7.750	7.250
Nickel Sil, 5%	9.250	9.000	4.625
Phos. br., A, B, 5%	11.000	10.750	9.750
Naval brass	8.250	8.000	7.500
Mang. bronze	8.250	8.000	7.500

Other than Brass Mill Scrap: Prices apply on material not meeting brass mill specifications and are fob shipping point; add ¾c for shipment of 60,000 lbs. of one group and ½c for 20,000 lbs. of second group shipped in same car. Typical prices follow:

(Group 1) No. 1 heavy copper and wire, No. 1 tinned copper, copper borings 9.75c; No. 2 copper wire and mixed heavy copper, copper tuyeres 8.75c.

(Group 2) Soft red brass and borings, aluminum bronze 9.00c; copper-nickel and borings 9.25c; car boxes, cocks and faucets 7.75c; bell metal 15.50c; babbit-lined brass bushings 13.00c.

(Group 3) Admiralty condenser tubes, brass pipe, 7.25c; muntz metal condenser tubes 6.75c; old rolled brass 6.75c; manganese bronze solids: (lead 0.00%-0.40%) 5.50c; (lead 0.41%-1%) 4.50c; manganese bronze borings: (lead 0.00-0.40%) 4.00c; (lead 0.41%-1%) 5.00c.

Aluminum Scrap: Price fob point of shipment, truckloads of 5000 pounds or over; Segregated solids, 2S, 3S, 5c lb., 11, 14, etc., 3 to 3.50c lb. All other high grade alloys 5c lb. Segregated borings and turnings, wrought alloys, 2, 2.50c lb. Other high-grade alloys 3.50, 4.00c lb. Mixed plant scrap, all solids, 2, 2.50c lb. borings and turnings one cent less than segregated.

Lead Scrap: Prices fob point of shipment. For soft and hard lead, including cable lead, deduct 0.55c from basing point prices for refined metal.

Zinc Scrap: New clippings 6.50c, old zinc 4.75c, fob point of shipment, add ½c for 10,000 lb or more. New die cast scrap 4.45c, radiator grilles 3.50c, add ½c for 20,000 lb or more. Unsweated zinc dross, die cast slab 5.30c, any quantity.

Nickel, Monel Scrap: Prices fob point of shipment; add ½c for 2000 lbs. or more of nickel or cupro-nickel shipped at one time and 20,000 lbs. or more of Monel. Converters (dealers) allowed 2c premium.

Nickel: 98% or more nickel and not over ½% copper 23.00c; 90-98% nickel, 23.00c per lb nickel contained.

Cupro-nickel: 90% or more combined nickel and copper 26.00c per lb. contained nickel, plus 8.00c per lb. contained copper; less than 90% combined nickel and copper 26.00c for contained nickel only.

Monel: No. 1 castings, turnings 15.00c; new clipping 20.00c; soldered sheet 18.00c.

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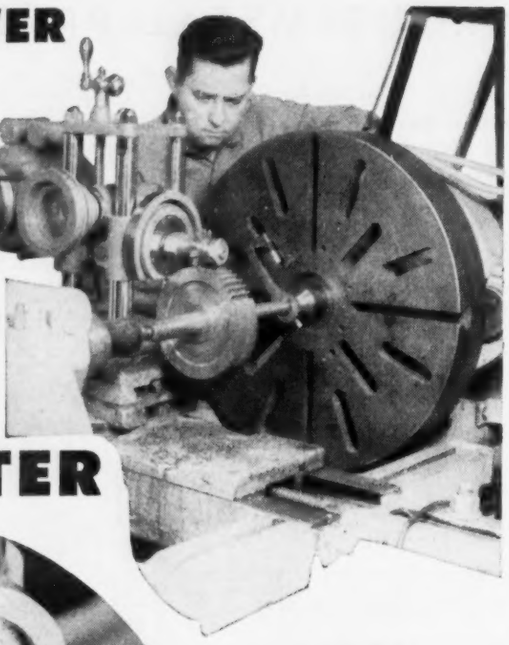
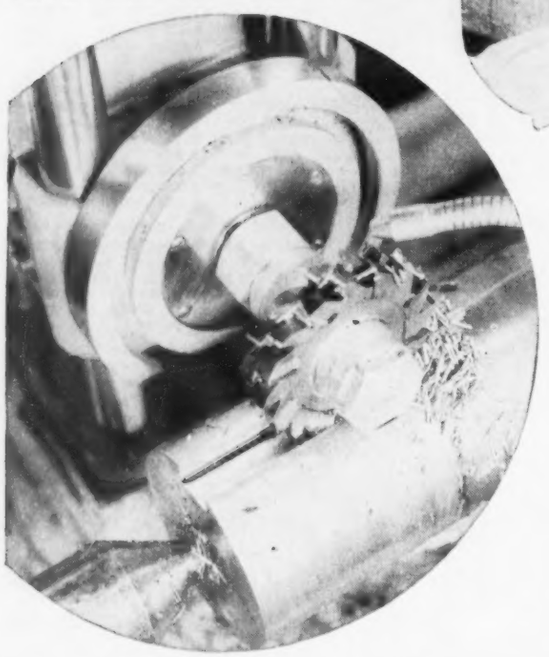
MASTER LATHE CONVERTER





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Sheets, Strip . . .

Sheet & Strip Prices, Page 196

After maintaining production of sheets and strip at a better rate than other products steelmakers now are feeling the effects of the fuel interruption to an extent that is causing tapering, which is likely to be sharper in the next week or two. Deliveries are slackening and consumers have increased pressure for shipments, with little success. Bookings by most producers are larger than can be filled during the present year and carryover into 1947 is expected to be heavy.

New York — With sheet production continuing to taper as a result of the coal strike, consumers are not only having difficulty placing orders, but in getting shipments against current commitments. Production throughout the greater part of last month was fairly well sustained, notwithstanding noticeable declines in certain of the major products; however, the soft coal dispute has now continued on to a point where shrinkage in supply of fuel is affecting sheet production at various points.

Producers have far more tonnage in sight than they will be able to handle this year, and most are obligated on more tonnage than they will be able to handle, with a result that the carryover into 1947 will probably be heavy. This applies to practically all grades, even including some of the specialties, such as electrical sheets and polished stainless sheets.

Philadelphia — Sheet sellers are falling behind on current commitments as production is increasingly retarded by the coal deadlock. Some producers claim they can hold their present delivery schedules for at least another two to three weeks, but others admit they are slipping badly. As for new commitments, producers generally make no promises. In the first place, obligations will carry them over the remainder of the year, either implied under the existing quarterly quota plan or definite under orders accepted and scheduled. Additionally, they are not accepting orders on the basis of delivery within a definite time after end of the coal strike, as that would carry them into next year and they are not disposed to book that far ahead at present.

Pittsburgh — Barring unexpected early termination of the coal strike, sheet production soon is expected to be curtailed. A leading producer has maintained near capacity output of sheets, tin plate, stainless steel and wire items despite the fact that the coal strike has forced sharp reduction in all other products. However, sheet and wire production likely will be reduced by the end of this week, while tin plate output is scheduled at the present pace through May 15. Indicative of the serious loss in steel production due to the steel strike and cessation of coal mining operations, industry's output for the full year, even under forced draft, would represent only 75 per cent of previously scheduled production.

Steel consumers meanwhile rely to an increasing extent on limited inventories. Some metalworking companies already have initiated gradual tapering and this trend is expected to become more pronounced over the next two weeks since steel stocks have been well below normal for months.

Chicago — Sheet mill operations here, already affected by the coal strike, are likely to suffer further shortly. Mean-

while, producers report pressure from consumers is terrific but they are helpless to do anything about it. Frequently orders are received for 1947, but these can receive no treatment other than acknowledgment. Occasional stories are heard of black market offerings of sheets, but these defy pinning down, and certainly are not in appreciable number.

Cleveland — April delivery of hot-rolled sheets increased 5 to 10 per cent over March, despite the adverse effect of the coal strike on steelmaking. Production is still high but is expected to decline rather rapidly in a week or 10 days since reserves and mill shipments of slabs are dwindling. Cold finishers are still operating at a high rate and do not anticipate any early curtailment.

Cincinnati — Threat of curtailment in district steel production and rolling operations, because of coal miners' strike, has resulted in even greater pressure for deliveries, and for position on mill books. Mill officials are indefinite as to date when shortage of fuel will cut output, and in the meantime one interest has stepped up operations. Demands of regular customers are beyond district capacity, and disappointment faces many potential customers inquiring for forward delivery positions.

St. Louis — Granite City Steel Co., this area's principal sheet and plate producer, is in its seventh week of idleness because of a machinists' strike. Books are filled through 1946 and will carry over through first quarter. Construction work on a $5 million cold mill also has ceased.

Superior Steel Granted Price Relief by OPA

Superior Steel Corp., Pittsburgh, last week was granted permission by the Office of Price Admistration to advance its prices for hot-rolled strip steel $17 per ton and on cold-rolled strip $33 per ton. New quotations of Superior are $3.30 per 100 pounds for hot-rolled strip up to 6 inches in width, and $3.20 per 100 pounds on sizes 6 inches and under. Current quotations at Pittsburgh, the base used by Superior, are $2.45 and $2.35 respectively.

Superior Steel's cold-rolled strip price now is $4.70 per 100 pounds compared with the regular market of $3.05, Pittsburgh.

New prices are effective as of Apr. 5.

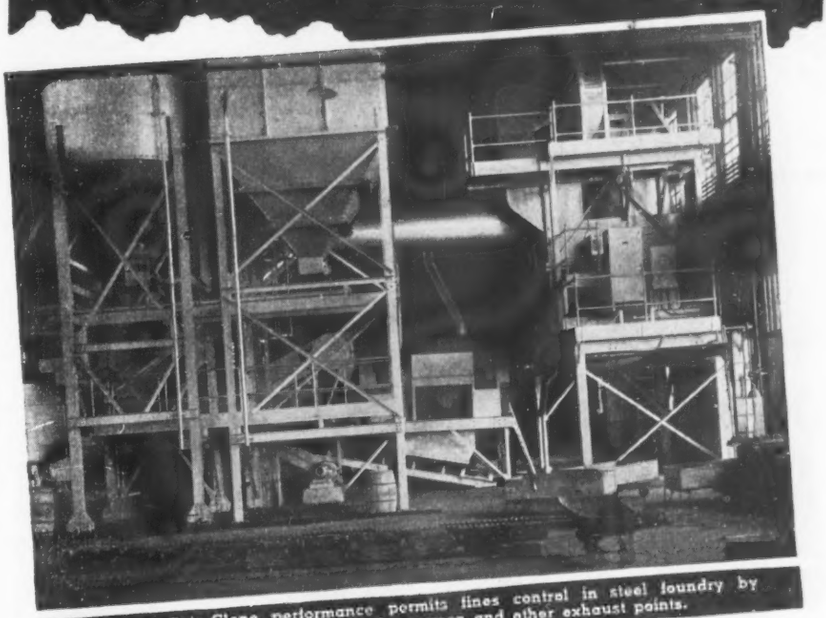
The reason ascribed for the increases is that Superior's products are of a special nature, the company turning out strip on specifications to fill needs of certain companies. New prices will apply on present backlogs only as the company is not booking new carbon steel tonnage in carrying ut its plans to withdraw from the low carbon steel market.

Reinforcing Bars . . .

Bar Prices, Page 196

Bar production is suffering from the general curtailment of steel production resulting from the coal strike. Larger sizes still can be bought for delivery in fourth quarter but on small sizes most producers are fully sold for the year. Most are not accepting orders for 1947. Consumers seek to place further tonnages but meet little success. Plain alloy bars are the exception and can be

a solution for
HEAVY DUTY
DUST CONTROL



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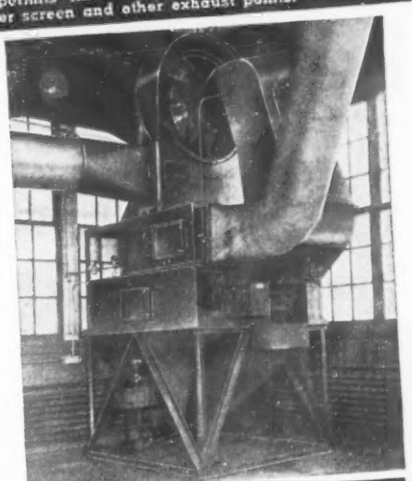

A Type W Roto-Clone in service in a New York Steel Foundry

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had for delivery in late June and July.

New York — Carbon bar sellers are still able to accept larger sizes of hot bars for fourth quarter, ranging 1½ inches and larger, and cold-drawn bars ranging ⅝-inch and larger. On all smaller specifications they generally are sold for the year and as they are not accepting tonnage for 1947 they are out of the market on these sizes. Plain alloy bars can still be had for shipment in late June and July. Deliveries on all products, of course, depend considerably upon how soon the coal strike will end and how long it will take steel producers to get back into operation.

St. Louis — Demand for merchant bars has increased sharply the last two weeks, partly due to mill curtailments in the East because of the coal strike. Barmakers term the pressure greatest in history, with buyers appealing even for single car lots. Allocations are strict, with mills trying to serve distress cases. New England users recently have come into this market, with little success. Bar mills are booked a year and beyond in some items. Bar production remains at capacity, no coal strike effect having been felt yet.

Cleveland — Decline in steelmaking operations has not yet appreciably reduced output of bars in this district, although sellers drawing on mills elsewhere report a steady decline. Most mills here will continue at a normal rate this week and possibly until May 15, when shortage of steel likely will force a gradual curtailment. All sellers are booked through the balance of this year on hot-rolled bars and some will be forced to carry a large tonnage over into first quarter. Cold finishers also are booked through 1946 on all sizes under 1-inch and into fourth quarter on larger sizes. Users of small bar sizes, such as household appliance manufacurers, are still pressing for openings on mill schedules or allocations of overruns but generally are unsuccessful.

Philadelphia — Carbon bar sellers believe that with early end of the coal strike they will be able to promise shipments on larger sizes before the end of the year. However, any such promise on sizes under 1½ inches on hot carbon and ⅝-inch on cold-drawn carbon now appears out of the question. Plain alloy bars are quoted for late June and July delivery, provided there is early end of the coal strike.

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Steel Plates . . .

Plate Prices, Page 197

Demand for plates is strong but little business can be placed for delivery before fourth quarter, this consisting mainly of universal plates. Some platemakers are out of the market for the year. Declining production because of lack of fuel is pushing deliveries further ahead.

New York — Approximately 37,000 tons of plates are required for the three passenger-cargo ships just placed by the Maritime Commission with Bethlehem Steel Co., for operation by the American Export Lines Inc. In addition approximately 13,000 tons of shapes and bars will be required.

General demand continues brisk, with producers having little to offer before fourth quarter and with at least two out of the market for the entire year and refusing to book tonnage for shipment beyond. Tonnage available before fourth quarter consists principally of universal plate.

Seattle — Plate demand is strong but shops are unable to get sufficient material to allow them to bid on all offered business. Some relief has been afforded by shipyard surplus stocks but consumption exceeds inventory replacement. An unstated tonnage is pending for 51,000 feet of 18-inch steel pipe for Hillsboro, Oreg. A power house at Fort Peck, Mont., will require 2000 tons of plates, 500 tons of shapes and 75 tons of reinforcing steel, bids about June 1. Seattle will receive bids May 16 for a steel tank and tower costing about $110,000.

Birmingham — Tank demand for plates is exceptionally heavy, with miscellaneous tonnage for shipbuilding and for lighter plates. While production has not thus far been affected by the coal strike, that eventuality is staring mills in the face. Deliveries are into last quarter and next year.

Boston—Tank quality plates, including welding grades in smaller gages, are sold through the remainder of this year with most mills, although selectivity in acceptance of new orders is a factor in channeling some volume to flange and firebox and other grades taking extras. In small gages of these, however, deliveries are becoming more extended in fourth quarter as capacity is taken. With shearing a bottleneck, heads and flanged semifibricated deliveries have lengthened to six months or more. Tank and boiler

fabricators, are confronted by abnormal divergence in co-ordinating supply of heads with plate deliveries. Demand for new boilers and replacements is substantial, with about 500 tons up for water storage tanks, 215 tons of which have been placed with Pittsburgh-Des Moines Steel Corp. Approval of bids submitted by Bethlehem Steel Co. on three passenger-cargo liners for American Export Lines accounts for close to 45,000 tons of steel, mainly plates, for the Bethlehem Quincy yard. Producers of weldments are about the only buyers of heavy plates, accounting for most activity in this range.

Philadelphia — Plate production in this district is declining as a result of the coal strike, one mill going down entirely this week because of shortage of coal, rather than pig iron and scrap, and is advising employees to accept this week as a vacation period rather than the usual first week in July. Another eastern plate producer has reduced operations to about 50 per cent of normal and claims that with steel on hand and continuation of this rate he could keep rolling mills at near capacity over the remainder of the month. He was not certain, however, that he could maintain the present ingot rate. Still another estimates he can keep his plate mills going at least two more weeks and another appears in a comfortable position with respect to both fuel and metal and is counting on at least a full month of good rolling operations, regardless of length of the coal strike. An important plate seller in this district, with mills outside, is now rolling plates at Pittsburgh, after a suspension of almost a month, diverting steel from other products.

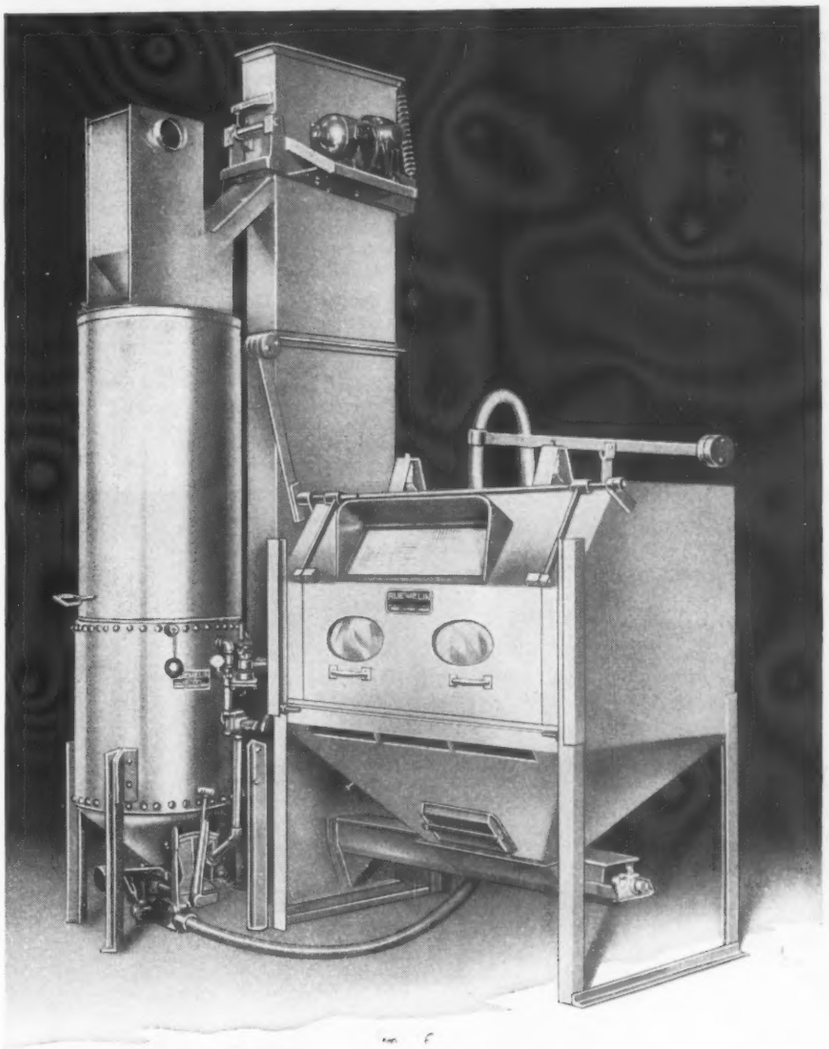
Lukens and Worth Given Price Relief on Plates

Office of Price Administration has granted price relief to two eastern plate producers, allowing Lukens Steel Co., Coatesville, Pa., an increase of $5 per ton, to 2.75c, base, per pound, and to Worth Steel Co., Claymont, Del., an advance of $2 per ton, to 2.60c, base, per pound. Central Iron & Steel Co., Harrisburg, Pa., recently was allowed an increase of $6 per ton on plates, and another eastern plate producer has applied for similar relief.

Wire . . .

Wire Prices, Page 197

Pittsburgh — As in other steel products, output of manufacturers' wire and merchant wire products has been hit hard, due indirectly to the coal strike, and further curtailment in production schedules is indicated. Jobbers' stocks of fencing, nails and other items are nearly depleted in many instances. Under present price ceilings wire manufacturers have been forced to convert most of their wire rod output into specialty items priced at more profitable levels than other grades. Unless additional price adjustments are granted, producers' output of wire rods, some merchant wire items, including nails for the critical housing program, and bright basic wire will remain restricted. A bale tie manufacturer recently warned that a large part of the nation's hay, alfalfa and peanut crops may be lost this year through



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shortage of baling wire, as output of this item has been substantially curtailed because producers must sell steel for bale tie manufacturers at $4 per ton under the regular market.

Birmingham — Wire continues one of the district's biggest worries. Farmers are badly in need of wire fencing and nails and many smaller manufacturers are working on irregular schedules for lack of adequate drawn wire.

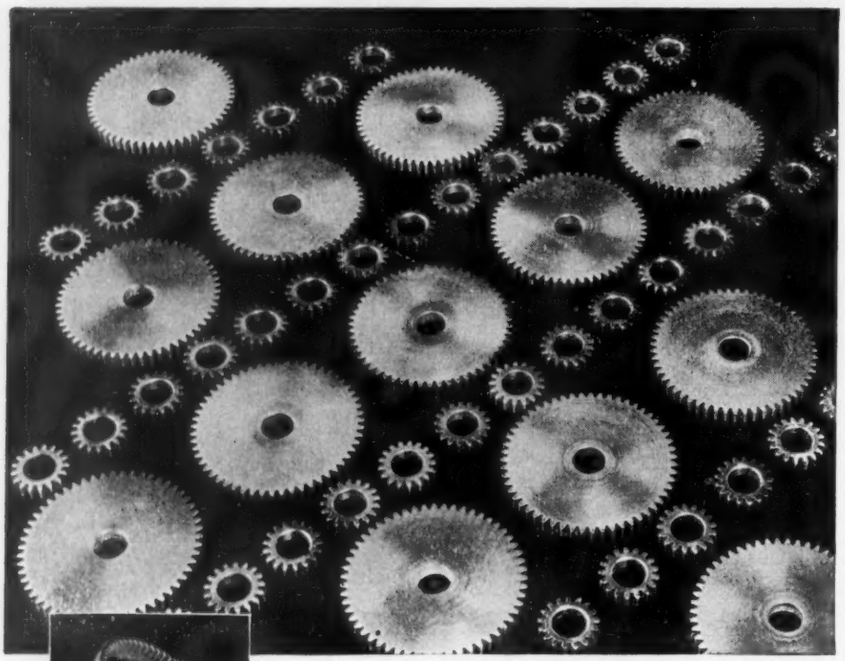
Tubular Goods . . .

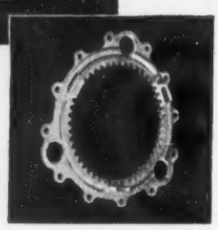
Tubular Goods Prices, Page 197

New York — Merchant pipe distributors here find it impossible to get stocks in balance. In fact, most, if not all, are thoroughly cleaned out on all sizes of black and galvanized pipe up to four inches, with inventories unbalanced even in larger sizes. Difficulty is ascribed to continued strong demand, combined with inability to obtain mill shipments. In most cases dstributors have the pipe sold before it is received. The situation promises to get worse before it improves, for now the coal strike is beginning to make itself felt, with the larger producers of pipe having increasing difficulty getting steel.

Seattle — Demand for cast iron pipe is active and strong, restrained only by lack of definite delivery promises. Numerous major projects are developing. General contract has been awarded at Tacoma for a project requiring 450 tons. Hillsboro, Oreg., has let contract for 4000 feet of 18-inch cast pipe. Beaverton, Oreg., has opened bids for 7880 feet of 18-inch cast pipe or alternates. Cowlitz County Public Utilities District, Longview, Wash., has asked bids May 27 for 31,450 feet of spiral welded pipe or alternate and a large footage of galvanized pipe.

Cleveland—Butt-weld pipe mills were operating at about 75 per cent of capacity in this district last week, with electric-weld and other pipe mills at a slightly higher rate. These rates will be cut this week since flow of skelp and other raw materials is tapering. Indications now are that some producers will be unable to issue quotas for June since carryovers from April and May will require total June production. Producers are unable to accept additional business for direct shipment to consumers, since schedules are filled for 1946 and next year's books have not been opened. Pressure on mills is still heavy, reflecting in part the fact that jobber's stocks, which usually can cover a substantial part of prompt needs, are depleted.





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Rails, Cars . . .

Track Material Prices, Page 197

New York — Recent wave of demand finds most car builders well behind on schedules, due in the first place to the CIO strikes for 18½ cents an hour increase which in the first quarter tied up a number of plants for several weeks and which, in fact, tied up certain units until as late as a week or ten days ago; and in the second place to shortage of materials, particularly steel and lumber.

Scarcity of steel reflects principally the steel strike earlier in the year and the jammed-up demand for steel from all directions and the shortage in lumber, the diversion of material for other purposes, notably for building construction. This situation recently was made more acute by Office of Price Administration regulations raising the ceiling on lumber for this purpose.

The Polish government is inquiring for 200 steam locomotives, by far the largest list of locomotives of this type now pending. Other foreign inquiry for steam locomotives is before the trade, but not definite in character. Effort has been made to have foreign governments utilize military equipment now abroad where possible and this has been done to a certain extent. Finland, for instance, has acquired some American locomotives originally built for Russia.

Southern Railway closed on 2000 freight cars at the end of April, bringing total domestic awards for that month up to an estimated 3630 cars.

Structural Shapes . . .

Structural Shape Prices, Page 197

Cleveland—Fabricated structural steel shapes and plates, formerly covered by the general maximum price regulation, have been suspended from price control, effective May 1. Some price increases are expected but OPA officials do not believe that excessive increases will result. Fabricators now will be able to give a more accurate estimate of construction costs, which will release many inquiries previously shelved, due to price uncertainties. Late fourth quarter and January deliveries are being promised. Inquiry has declined, due to seasonal

factors and inability of builders to get sufficient quantities of other materials.

Philadelphia — While the ceiling on fabricated steel for building and certain types of tank construction has been suspended by OPA it is believed in some quarters that escalator clauses will continue to appear in many contracts, particularly because of uncertainties as to future wage rates in the building trades.

Pittsburgh — Coal strike has forced almost complete closing of structural and plate mills here, forcing some fabricators to curtail operations, with more drastic reduction indicated soon. Fabricators report new inquiries holding up well despite CPA building regulations. Some larger projects have been delayed until proposed programs can be reviewed in light of these regulations. However, CPA officials apparently are approving many industrial plant expansions, as structural awards continue in large volume. Mill order backlogs are heavy, extended into November in most instances. Most of this tonnage is for projects already started, while requirements of railroads, public works, etc., not covered by the regulations, are substantial.

Chicago — Structural steel fabricators are pleased by OPA announcement that general maximum price regulations are being suspended, effective immediately. Expectation is that the industry now will be able to pass along to the consumer their higher costs, including both steel and labor, and without the necessity of invoking various escalator clauses which have been cumbersome. Spokesmen express little fear that the pricing situation will get out of hand. Rather they expect the competitive situation to keep the situation under control. Reflecting the shortage of shapes and government restrictions on building, inquiry continues light, and awards show an appreciable dip from recent weeks.

Seattle—Fabricators report inadequate steel supply to meet current demand and many major projects are being delayed. Isaacson Iron Works will supply 1250 tons, in addition to 250 tons recently placed, for a mill for the Weyerhaeuser Timber Co., Longview, Wash. District Civilian Production Administration has approved several projects in this area, including $6,700,000 in buildings for the University of Washington and an eight-story addition to the Securities Bldg., Seattle.

Reinforcing Steel . . .

Reinforcing Bar Prices, Page 197

Chicago — Demand for reinforcing steel, while considerably reduced from recent weeks, still far exceeds supply. Already far behind in receiving their quotas and now threatened with further shrinkage in receipts due to the coal strike, suppliers consider themselves virtually out of the market for months to come. They no longer seek business, rather try to avoid it, knowing that consumers they are obligated to serve because of patronage over the years will more than absorb the steel they will be able to get.

Seattle — Reinforcing bar demand is increasing and will expand further as soon as building restrictions have been eased. Local mills have booked several hundred tons in small lots. Bethlehem Pacific Steel Co. is supplying 200 tons for a grain elevator in eastern Washington, 200 tons for Centennial flour mill at Tacoma, Wash., and 100 tons for an auto freight depot at Seattle. Largest pending tonnages include 1500 to 3000 tons for navy piers at Tongue Point, Oreg., and Puget Sound Yard, 1000 tons for the proposed Frederick & Nelson department store addition at Seattle and bars for Coulee irrigation projects.

Pig Iron . . .

Pig Iron Prices, Page 199

Because of the coal strike and resulting decreased production of pig iron melters are hard pressed, especially as scrap is scarce at the same time. More blast furnaces are being banked or operated on reduced blast because of lack of coke and as the coal strike continues this will be increasingly the case.

New York — Indications point to a lower melt at district foundries this month than in April. Even should the coal strike be settled promptly, some trade leaders believe that consumption of pig iron will be off because inventories are low and that blast furnaces now down will require at least a week or ten days to get back into full production. Should the strike continue for at least another week, there appears little doubt but the melt would be substantially less than in April.

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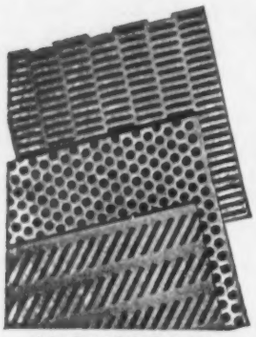

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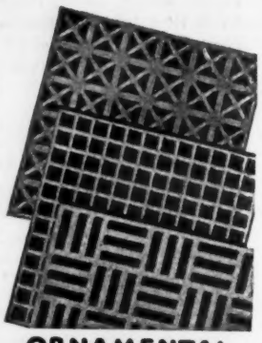

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are pressing for all available scrap and are using ferroalloys more and more in an effort to sweeten mixtures. Demand for castings remains heavy, with steel foundries confronted by more work than recently. Labor supply shows further improvement; it is the scarcity of raw materials, especially iron and also in some cases coke, which is the restricting factor. By-product coke production is being devoted almost entirely now to metallurgical purposes, with little for heating requirements, with the general consumption of coal for coke-making purposes now being reduced 50 per cent at certain by-product plants.

Pittsburgh — In most instances pig iron is more critically short than coke. Consumers' iron stocks were hard hit during the steel strike and since the first week of the coal strike shipments of iron into this area from other points have been well below normal. Most foundries are steadily reducing reserves and soon will have to curtail production. At present only 27 out of 54 blast furnaces are active in this district, and some of these are not operating at capacity. The merchant pig iron producer here plans to maintain capacity output through the middle of May.

Cleveland — Two additional blast furnaces in northern Ohio were banked last week and others will either be banked or placed on reduced blast by the end of this week. Foundries received fair deliveries last month but not sufficient to cover current consumption, forcing them to reduce reserves. Coke supplies, which are approaching the critical level, may be depleted before those of pig iron. Some foundries have reduced their work weeks to conserve supplies.

Philadelphia — At least three blast furnaces in eastern Pennsylvania have recently suspended operations, with one, the smaller of the two at Swedeland, Pa., blowing out for repairs. Thus various consumers are being further squeezed for iron and some are taking the occasion to set up vacation schedules this week instead of later in the season. It may be pointed out, however, that such action at some plants is being dictated as much, if not more, by shortage of coke. One of the largest industrial concerns in the district is closing its foundries temporarily because of this shortage.

Chicago — Foundries are reducing operations to correspond with available pig iron and coke, both of which are in short supply. Two more blast furnaces were banked last week, one of these a merchant iron producer. This leaves 19 stacks in production as compared with 34 before the coal strike. Further bankings are expected this week.

Cincinnati — Curtailment of foundry melt has begun. So far the recession is slight but prospects are that it will become worse. Furnace interests are unable to give definite promises on shipments during May.

Buffalo — With pig iron production in this area cut to 56 per cent of capacity pressure for delivery has been checked by shortage of coke at foundries. Producers, however, find plenty of demand for their output. Seven of 16 blast furnaces in this district have been banked and others are operated on low blast. Local automotive plants report interruption of castings shipments from Michigan foundries.

St. Louis — Pig iron remains in short

supply, although some improvement has resulted from shutdown of a mill which normally takes half the pig iron output. Production, which recently was shifted to malleable iron, is back now to basic. Output continues at capacity, so far unaffected by the coal strike. Most melters are below a 30-day stock, and demand is unabated.

Birmingham — Pig iron users generally are divided into two classes, those with established contacts who are getting by in fairly good shape, and hand-to-mouth buyers who are hard pressed. The pig iron shortage is working hardship on some foundries and is costing cast iron pipe shops considerable time.

Scrap . . .

Scrap Prices, Page 200

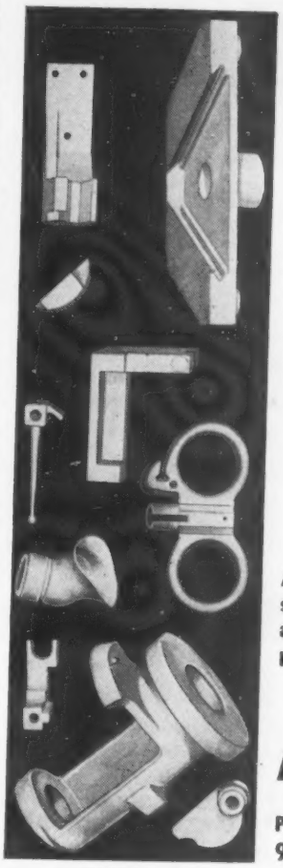
No easing is apparent in scrap supply, while demand continues heavy. Less industrial scrap is coming out as fabricators taper operations because of shortage of steel. Steelmakers continue to seek scrap to build reserves for use when full steel production is resumed. Railroads are not offering as much as usual.

New York — Continuation of the coal strike with its restrictions on production of pig iron is resulting in further pressure for scrap, especially foundry scrap, local foundries inquiring for far more than is available. Demand for borings and turnings and heavy melting steel also is brisk, despite the fact that various consumers are curtailing consumption. Pittsburgh consumers, as well as eastern seaboard buyers, are in the market. Heavy melting steel grades continue to move more freely than a month or so ago, but there are no important accumulations in dealers' yards.

Pittsburgh — If the coal strike is not ended by May 15, a sharp reduction in industrial scrap is indicated. Dealers and brokers already report a slight recession in this scrap, for some metalworking companies have begun tapering operations to conserve steel inventories. Brokers report that despite curtailment in overall steel production, many steel companies have been unable to increase scrap inventories and the problem of getting scrap to support expected peak operations for many months after the coal strike is cleared up remains as formidable as at any time since V-J Day. Most of the scrap produced by auto manufacturers to date has been absorbed in a short radius of their plants. Railroads are apportioning scrap carefully, many of which are far behind delivery schedules on recent offerings. The Pennsylvania Railroad has omitted offering No. 1 heavy melting steel on its last four monthly lists. Fact that a leading steel mill has been absorbing its own production of low phosphorus scrap has tightened the supply situation here in this item considerably.

Cincinnati — Iron and steel scrap is not coming out in volume to meet demands imposed by diminishing shipments of pig iron. Foundries are nearing a critical point, unable by lack of sufficient scrap to conserve any great proportion of pig iron. Mills are taking all offerings as they are now maintaining operations near capacity and would, if possible, build scrap stocks against future melt even if forced to shut down.

Philadelphia — Notwithstanding decline in consumption because of the coal strike buyers of scrap still are specifying



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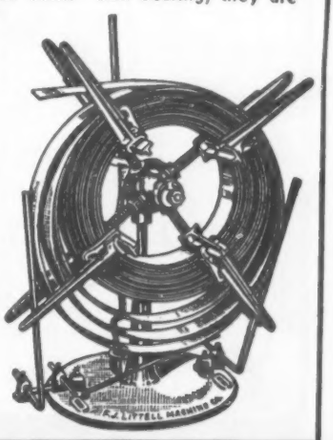

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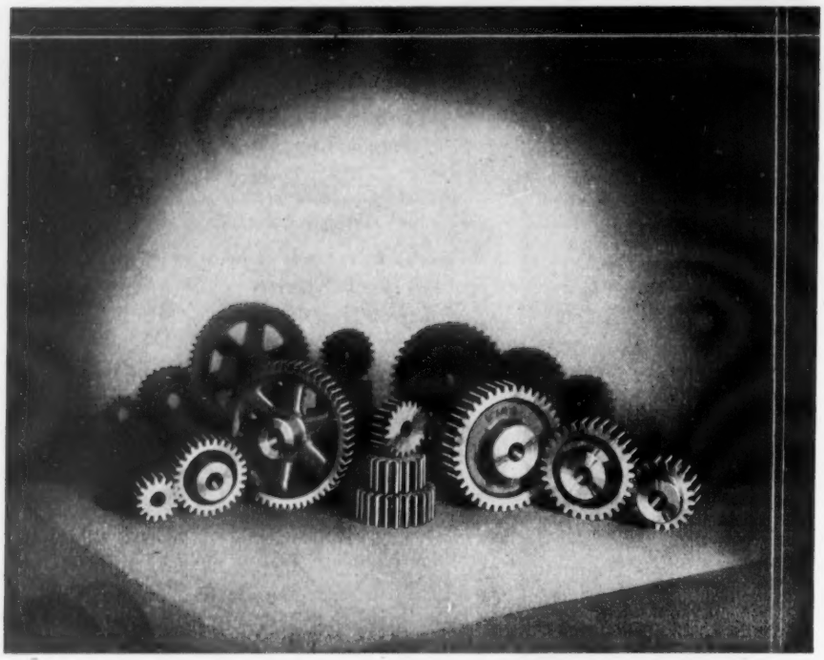

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heavily. In fact, curtailment in consumption has given some of them the first opportunity in a long while to build up inventories, at least to some extent. Some consumers of heavy melting steel are buying low phos scrap cut only to charging box size, but paying the low phos differential in an effort to meet pressing current needs or to build up reserve. Consumers generally believe that after the coal strike is settled it will take some time for blast furnaces to get back to normal operation. The result of this low phos buying by open-hearth operators has been to cut seriously into supply for electric furnace operators. The average seller favors the former because less preparation is required.

Chicago — Despite declining steelmaking rate because of the coal strike, demand for scrap holds all its strength. This is due partly to the fact that with the decline in hot metal greater dependence is being put on scrap and also partly to the fact that the coal strike will end sometime and steelmaking will return to a high level. Foundries also have been leaning more heavily on scrap because of pig iron shortage. Cast grades are extremely scarce. All consumers are reaching far afield for material and freely paying springboard. With exception of alloy scrap, full ceiling prices are being maintained.

Buffalo — Heavy inroads are being made on scrap reserves to make up for lack of pig iron. Yard receipts are low and dealer stocks are well depleted. Cast scrap has tightened further as Worthington Pump and American Radiator resumed acceptance of shipments after strike tieup of more than three months. Dealers claim outside mill buying is cutting into supplies from downstate.

St. Louis — Scrap supply remains fair, with demand high. Shipments are improving because of favorable weather and manpower. Heavy melting steel is under considerable pressure, although demand for all items is good. Mill and foundry reserves are 45 days or better. One sheet mill, shut down by a strike seven weeks, has succeeded in stockpiling over 60 days. Generally, however, ground inventories are little changed.

Birmingham — Scrap demand continues upward while supplies have the opposite tendency. Cost of preparation is a major obstacle to an adequate supply, with lack of industrial and shipyard scrap. Cast grades, especially, are not to be had.

Seattle — The steel scrap market advanced last week from $12.50, fob mill, to the ceiling, $14.12, Portland prices being advanced from $12 to $14. Large tonnages have been shipped to eastern mills from the Portland area. Supplies at Seattle are satisfactory, material continuing to come from nearby shipyards. The higher prices are expected to bring additional supply. Cast scrap is below requirements.

Ratio of Scrap Use to Pig Iron Consumption Increases

Consumers of ferrous metals used 51 per cent scrap and 49 per cent pig iron in 1945, compared with 50 per cent each in 1944, the Bureau of Mines reports. Preliminary figures indicate that 50,237,000 tons of ferrous scrap and 47,473,000

tons of pig iron were used in 1945 compared with 54,776,073 tons and 54,421,000 tons, respectively, in 1944.

In December, 1945, use of purchased and home scrap declined 7 and 5 per cent, respectively, from November, and pig iron consumption continued at the relatively high rate of November.

Steel furnaces used 47 per cent scrap and 53 per cent pig iron in December, compared with 49 per cent and 51 per cent, respectively, in November.

Warehouse . . .

Warehouse Prices, Page 198

Philadelphia — Some leading jobbers here booked a heavier average daily tonnage in April than for any other month this year and one distributor believes that when all records are in his tonnage will prove heaviest for any month since last May. Outlook for the current month, however, is less promising as incoming shipments already are beginning to taper noticeably and jobbers generally are turning down the many large orders being offered, but declare that in spite of this their business is heavy, because of the large number of small orders.

Pittsburgh—Distributors are limiting shipments to regular customers and rationing steel to meet essential needs. Some warehouses have been receiving fair tonnages from mills the past month but far below needs. Continued heavy demand is noted for 10-inch beams and 6-5-4-inch channels. Heavy demand for galvanized sheets has left stocks practically depleted. A steady increase has developed for 10-11-12-gage hot-rolled sheets for truck bodies.

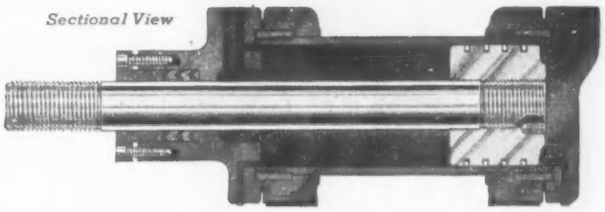
Steel in Europe . . .

London—*(By Cable)*—Activity of light foundries in Great Britain is increasing but fuel still is a limiting factor. The shortage of steel billets continues. More steel is being sought from abroad. All branches of the heavy steel industry are fully engaged.

Canada . . .

Toronto, Ont. — Canadian steel mills continue to face heavy demand for all products and while some have withdrawn from the market with books filled for second quarter, others are accepting additional bookings but are making no definite promise on deliveries. The recent advance in steel prices has settled this problem but steelmakers now face prospects of labor troubles which may further curtail output. While not all companies may be directly affected with regard to increased wage demands it is possible that sympathy strikes may be called. The coal strike in the United States also is causing worry to many Canadian steel mills despite the fact that some still have fairly large stocks.

Industrial interests as a whole press for increased deliveries but meet little improvement. At present there are no indications of easing in the steel supply situation and delivery dates against new orders are steadily becoming more extended. In practically all lines of manufacture in which steel plays a part there is serious shortage, particularly in motor cars, agricultural implements, tractors and all types of household electrical equipment.



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Built in seven standard mounting types, in a full range of sizes, for any length stroke. Many special types and large sizes available. Write for hydraulic cylinder bulletin.

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Where runs are too short to justify the use of a spacing table, or where irregular plates must be handled, this modern Thomas Duplicator is ideally adapted. It affords rapid, precision duplication of holes, notches or slots, and will speed production in car-shops, bus and truck building plants and in numerous other fabricating operations in varied industries.

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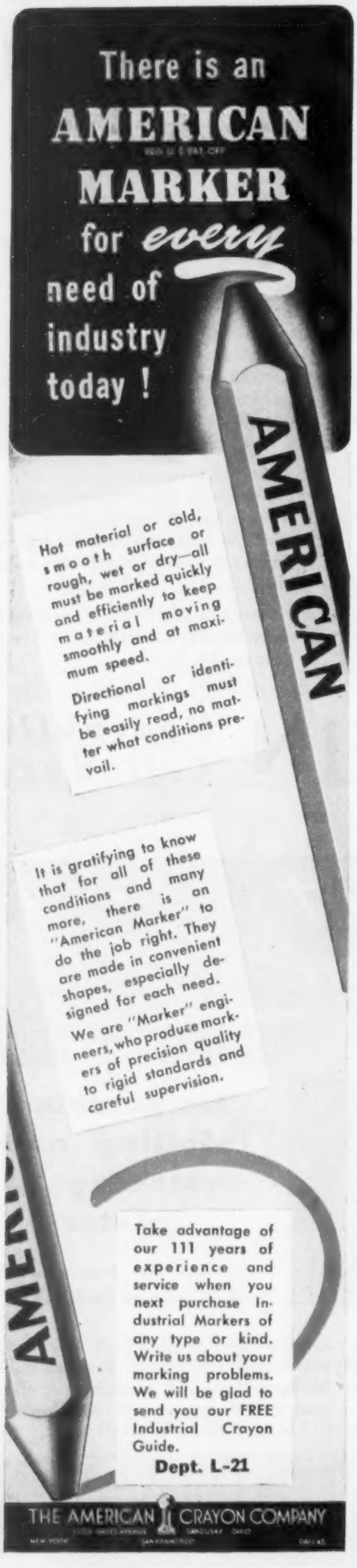
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THE AMERICAN CRAYON COMPANY

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

1400 tons, pipe racks, Texas City, Tex., for Carbide & Carbon Chemicals Corp., New York, to American Bridge Co., Pittsburgh.

1250 tons (250 tons additional previously reported) sulphite mill, plant improvements and other structures, Weyerhaeuser Timber Co., Longview, Wash., to Isaacson Iron Works, Seattle.

1200 tons, Firestone Memorial Library, Princeton University, to American Bridge Co, Pittsburgh.

1000 tons or more, galvanized steel towers and appurtenances, Bureau of Reclamation, Denver, to Bethlehem Pacific Coast Steel Co., San Francisco, $484,090.44, delivered net to government.

450 tons, bridges, New Alexandria, Pa., to American Bridge Co., Pittsburgh, through Latrobe Road Construction, Inc.

375 tons, additions, stock house No. 3, Pittsburgh, to American Bridge Co., Pittsburgh, through Landau Bros. Building Co., Pittsburgh,

840 tons, relocation of Pennsylvania railroad, Conemaugh river reservoir, Saltsburg, Pa., to Commercial Shearing & Stamping Co., Youngstown, O.; Herman Holmes, Crystal City, Mich., contractor; bids March 15.

450 tons, reconstruction of engine house, Englewood station, Chicago, for New York Central Railroad, to Bethlehem Steel Co., Bethlehem, Pa.; Ellington Miller Co., Chicago, contractor; bids March 29.

300 tons, manufacturing building, Williamsport, Pa., to American Bridge Co., Pittsburgh, through Lundy Construction Co.

275 tons, warehouse addition, Chicago, for Benjamin Wolff & Co., to American Bridge Co., Pittsburgh.

275 tons, addition to Securities Bldg., Seattle, to Isaacson Iron Works, Seattle.

250 tons, kickback trestle, Lorain, O., for Baltimore & Ohio Railroad, to American Bridge Co., Pittsburgh.

250 tons, sheet piling, shore protection, Evanston, Ill., for city, to Inland Steel Co., Chicago; Thor Broten, Evanston, Ill., contractor; bids April 14.

210 tons, bridge RC-46-14, Binghamton, N. Y., to American Bridge Co., Pittsburgh, through Serafini Construction Co., Inc.

175 tons, plant addition for Trenton Pottery Co., Trenton, N. J., to Belmont Iron Works, Eddystone, Pa.

175 tons, bridge No. 2012, Sheboygan, Wis., for Chicago & North Western Railroad, to American Bridge Co., Pittsburgh.

160 tons, phenol treating plant tower, Whiting, Ind., for M. W. Kellogg Co., New York, to American Bridge Co., Pittsburgh.

150 tons, store building extension, Rochester, N. Y., to American Bridge Co., Pittsburgh, through John B. Pike & Sons.

120 tons, bridge, TSO-45-2, Hyde Park, N. Y., to American Bridge Co., Pittsburgh.

100 tons or more, auto freight depot, Seattle, to Standard Steel Fabrications Co., Seattle.

Unstated tonnage, drum gates, control equipment and miscellaneous metal work, bureau of reclamation, Friant, Calif., to Consolidated Steel Corp., Los Angeles, $134,150.

STRUCTURAL STEEL PENDING

1200 tons, trash racks, Grand Coulee dam, Odair, Wash., for U. S. Bureau of Reclamation.

820 tons, DPG spans and towers for bridges 33, 36 and 40, Montana, for Yellowstone division, Northern Pacific railroad.

800 tons, engineering and experimental building, La Grange, Ill., for Electro-Motive Division, General Motors Corp.; bids April 19.

500 tons, powerhouse and structures, Fort Peck, Mont.; bids about June 1.

400 tons, coffer dam, Shasta dam, Central Valley, Calif., for U. S. Bureau of Reclamation.

300 tons, pattern shop and storage building, Chicago, for Pettibone Mulliken Corp.

250 tons, manufacturing plant, Jackson, Miss., for Armstrong Cork Co.

225 tons, warehouse building, Davis dam, Louise, Ariz., for U. S. Bureau of Reclamation.

200 tons, viaduct, Indianapolis, for Pennsylvania railroad; Smith & Johnson, Indianapolis, contractors; bids April 5.

165 tons, state bridge in Lackawanna county, Pennsylvania; Pine Brook Iron Works, Scranton, Pa., low.

Unstated, gate hoists for Davis dam; Western Machinery Co., Portland, low to Denver, $139,914.

Unstated, 184-foot steel span and 251-foot steel span, Montana state highway projects; W. P. Roscoe Co., Great Falls, low, $62,121 and $40,871, respectively.

Unstated, 174-foot steel overpass, Montana; Dudley Construction Co., Great Falls, low, $54,714.

REINFORCING BARS . . .

REINFORCED BARS PLACED

2100 tons, new plant, Chicago, for R. R. Donnelley & Sons, to Olney J. Dean Steel Co., Chicago; Peter Hamlin Construction Co. Inc., Chicago, contractor.

220 tons, coal dock, Lorain, O., to Carnegie-Illinois Steel Corp., Pittsburgh.

200 tons, grain elevators in Eastern Washington, to Bethlehem Pacific Steel Co.

200 tons, Centennial flouring mills, Tacoma, Wash., to Bethlehem Pacific Steel Co.

175 tons, factory building, Madison, Wis., for Forsberg Paper Box Co., to Ceco Steel Products Corp., Chicago; J. H. Findorff & Co., Madison, Wis., contractor; bids March 18.

100 tons, auto freight depot, Seattle, to Bethlehem Pacific Steel Co.

REINFORCED BARS PENDING

3000 tons or more, Columbia Basin projects, Coulee dam; bids in May.

3000 tons or more, Navy inactive bases Tongue Point, Oreg., and Puget Sound navy yard; bids pending.

1000 tons, Seattle department store addition; bids soon.

220 tons, East Sidney dam, Delaware county, New York; bids May 17, U. S. engineer, Syracuse, N. Y.

165 tons, roll-filled dam, near Hot Springs, S. Dak., Cottonwood Springs creek; bids about May 20 to U. S. engineer, Fort Peck, Mont.

PLATES . . .

PLATES PLACED

215 tons, water storage standpipe, Groton, Conn., to Pittsburgh-Des Moines Steel Co., Pittsburgh.

PLATES PENDING

2000 tons or more, tanks, penstocks, etc., Fort Peck dam; bids to U. S. engineer soon.

250 tons, pressure holder, Morris, Ill., for Public Service Co. of Northern Illinois; revised bids in.

155 tons, 1,300,000-gallon water storage tank, Hudson, Mass.; bids in.

115 tons, 500,000-gallon water storage tank, Wenham, Mass.; bids May 7.

Unstated, 51,000 feet 18-inch pipe, Hillsboro,

Oreg.; P. S. Lord & Co., Portland, general contractor.

Unstated, elevated steel tank, Magnolia Bluff improvement, Seattle; bids May 16, estimated cost $110,000.

Unstated, penstocks and other items, Mountain Home project, Idaho; Spec. 1316; bids to Denver, June 3.

PIPE . . .

CAST IRON PIPE PENDING

450 tons, improvement at Tacoma, Wash.; general contract to Paine & Gallucci, Seattle, $48,098.

Unstated, 4000 feet, 18-inch. Hillsboro, Oreg.; general contract to P. S. Lord & Co., Portland, Oreg.

Unstated, 7880 feet cast iron or alternates, Beaverton, Oreg.; bids in; Cunningham and Associates, Portland, Oreg., engineers.

RAILS, CARS . . .

RAILROAD CARS PLACED

Bangor & Aroostook, 100 fifty-ton rack cars, to Magor Car Corp., Passaic, N. J.

Southern Railway, 2000 freight cars; 1000 box cars to Pullman-Standard Car Mfg. Co.'s plant at Bessemer, Ala., 600 gondolas to Pressed Steel Car Co. plant at Mt. Vernon, Ill., 250 ballast cars to American Car & Foundry Co. plant at Madison, Ill., and 150 hopper cars to Harlan & Hollingsworth Corp., Wilmington, Del.

CAR ORDERS PENDING

Interstate Railway, 200 fifty-ton hopper cars, bids asked through the Central Supply Co. of Virginia.

LOCOMOTIVES PENDING

Polish government, 200 steam locomotives; bids asked.

World's Steelworkers Aim At Guaranteed Work, Wage

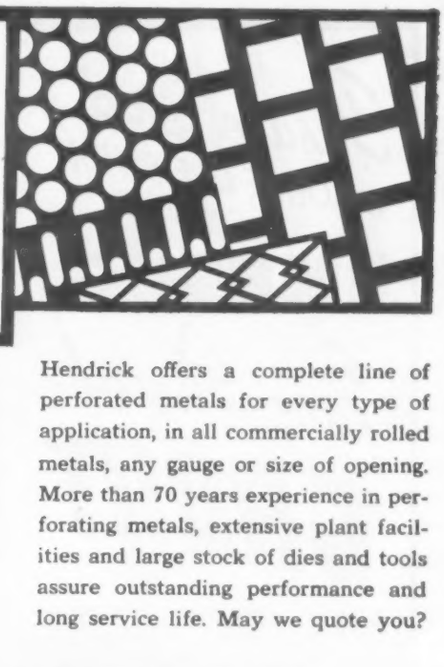
(*Continued from Page* 106)

mediately, he said that after the backed up demand for steel products had been satisfied "there is going to be a profound effect on employment and the national well being."

He suggested to the committee that the ILO study the effect of coming technological improvements and expansion and consider ways in which displaced persons could be retrained and placed in other industries.

The workers' representatives proposed a resolution providing for a study by ILO of the practices pursued in regard to the introduction of technological improvements and their immediate and long-range impact on employment. They proposed special attention be given to: 1—Timing of the introduction of new equipment so as to cushion its impact upon employment; 2—training of displaced workers for other employment, the cost of such training and the payment of wages until the workers are placed in new employment being charged against the cost of the new equipment; and 3—the planning of the absorption of displaced workers into other work,

PERFORATED METALS
for every industrial use



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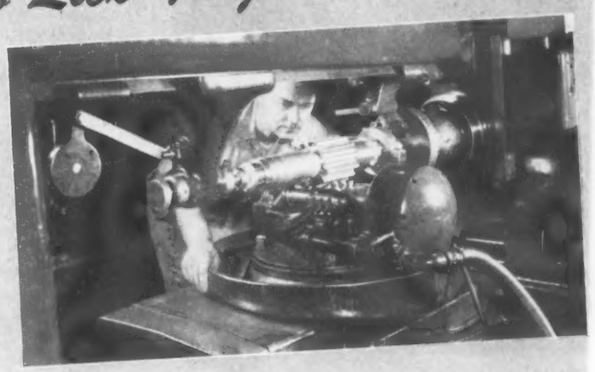

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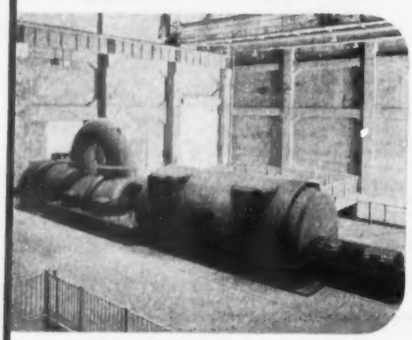
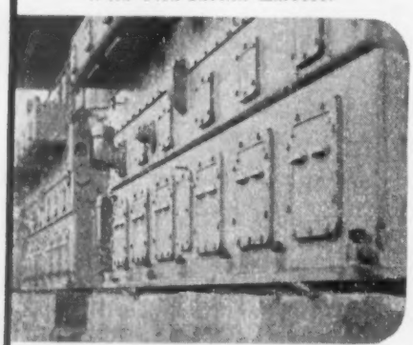


Large Turbo-Generator Unit Grouted With Non-Shrink Embeco.



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1. It employs Cement Dispersion, which produces good flowability even when water content of grout is reduced up to 15%.
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having regard to the rate of labor turnover and wastage.

Employer delegates favored a full investigation of the matter but objected to listing the specific items mentioned by the workers. These were stricken from the resolution as passed and the committee approved the study.

Special attention was given to the underdeveloped countries, particularly India and China, and the committee suggested that the Economic and Social Council of the United Nations be invited "to make known to the competent specialized international agencies the advisability of their considering favorably financial, technical and other appropriate measures for facilitating a healthy growth and expansion of industry in the underdeveloped countries, particularly the iron and steel industry, as a means of achieving high and stable employment for the attainment of satisfactory levels of living; and recommends to the various member states of the ILO that they consider favorably the implementation of programs for the international exchange of vocational trainees and industrial technicians for the purpose of facilitating the industrial development, particularly in the iron and steel industry, of underdeveloped countries."

It was pointed out that the United States already is aiding in the training of students from underdeveloped countries (see page 118).

A subcommittee on industrial relations offered several resolutions affirming the rights of workers and employers to form occupational organizations, endorsing the principle of collective bargaining and affirming the necessity for strict observance of such agreements. The subcommittee also recommended ILO make a series of studies on labor legislation, practices and conditions in the various countries and that the results of these studies be made available to the member states.

Delegates to the conference from France, Belgium and Luxembourg described the condition of the iron and steel industry in their countries as extremely grave due to the acute shortage of coal and coke. The fuel shortage also prevails in Sweden and Italy although the situation in those countries is not so serious. The committee approved a resolution calling for action by the appropriate agencies for alleviating the fuel shortage as rapidly as possible.

CONSTRUCTION AND ENTERPRISE

ARKANSAS

EL DORADO, ARK.—Lion Oil Co. is building a catalytic cracking plant at its refinery, general contract to Lummus Co., Esperson Bldg., Houston, Tex., at about $1,250,000.

CALIFORNIA

BELL, CALIF.—Bell Aluminum & Brass Foundry has been formed by George Smith and is conducting business at 4357 Live Oak St.

COMPTON, CALIF.—C. & S. Metal Products has been formed by Robert Sandstrom and associates and has located at 11817 Atlantic Ave.

EL SEGUNDO, CALIF.—Foundry Materials Co. has been formed by George E. Gordon Jr. and has established its operations at 105 West Grand Ave.

HUNTINGTON PARK, CALIF.—Apex Machine Works, organized by Robert J. Brown, has established its plant at 5970 Maywood Ave.

LOS ANGELES—National Coupling & Engineering Co. has been incorporated with $150,000 capital and is represented by Bauder, Veatch & Gilbert, 939 Rowan Bldg.

LOS ANGELES—Atlas Industrial Engineering Co. has been organized by H. S. Bamberger and has located at 641 East Washington Blvd.

LOS ANGELES—Electric Equipment Co., 1611 South Hope St., has let contract to C. L. Peck, 354 South Spring St., for a one-story plant 50 x 155-foot plant, to cost about $60,000. Kaufmann, Lippencott & Eggers, 627 South Carondelet St., are architects.

OAKLAND, CALIF.—Holt Mfg. Co., Grove and Twentieth Sts., has let contract to John F. Tulloch, 3428 Ettie St., for a plant addition, to cost about $75,000.

PASADENA, CALIF.—Burner Devices has been formed by J. S. Johnson and associates and is operating at 875 South Arroyo Parkway.

ROSEVILLE, CALIF.—Jones Steel Products Co., Walter E. Jones, president, will build two additions 40 x 120 feet and an office building, to increase production capacity.

SALINAS, CALIF.—Gabilan Iron & Machine Co. has been incorporated with $75,000 capital and is represented by Harry L. Noland, Salinas National Bank Bldg.

SAN DIEGO, CALIF.—Solar Aircraft Co. has renewed lease with the harbor commission and will undertake a long-range expansion program involving about $600,000.

SOUTH GATE, CALIF.—Hydro-Drive Co. of America has been formed by Leslie W. Overstreet and associates and is operating at 4973 Firestone Blvd.

CONNECTICUT

BRIDGEPORT, CONN.—Singer Co., 803 East Washington Ave., has let contract to the Austin Co., 19 Rector St., New York, for a five-story plant building, to cost about $500,000.

MIDDLETOWN, CONN.—Wilcox Crittendon & Co. Inc., 234 South Main St., has let contract to Mott-Mohr Construction Co. Inc., 440 Elm St., for a two-story 100 x 155-foot and 40 x 55-foot plant, estimated to cost about $150,000. Wescott & Mapes, 609 Church St., New Haven, Conn., are engineers.

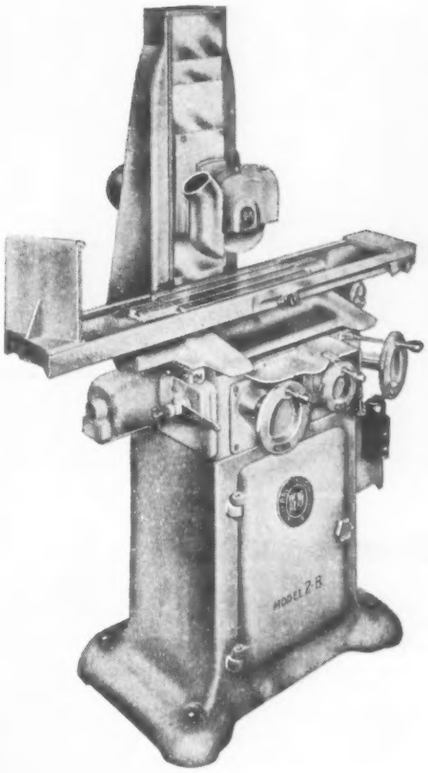
ILLINOIS

CHICAGO—B. Wolff & Co., 2035 West 58th St., has let contract to James McHugh Co., 6449 South Park Ave., for a one-story 223 x 266-foot plant building, to cost about $200,000. A. Epstein, 2001 West Pershing Rd., is engineer.

CHICAGO—New York Central railroad, E. A. Dougherty, 139 West Van Buren St., chief engineer, has let contract to Ellington Miller Co., 25 East Jackson Blvd., for an engine

PRECISION REID SURFACE GRINDERS

46 YEARS of PRECISION MANUFACTURING



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Reid Precision Surface Grinders built to handle your work in an efficient and time-saving way. Every possible improvement has been made to assure you close tolerance and a finer finish at lower cost. All working parts are designed and fitted to prevent abrasives from penetrating and causing undue wear. Accessibility and new design of hand wheels assure you accurate finger tip control. An outstanding precision machine with balanced design and attractive finish at moderate cost.

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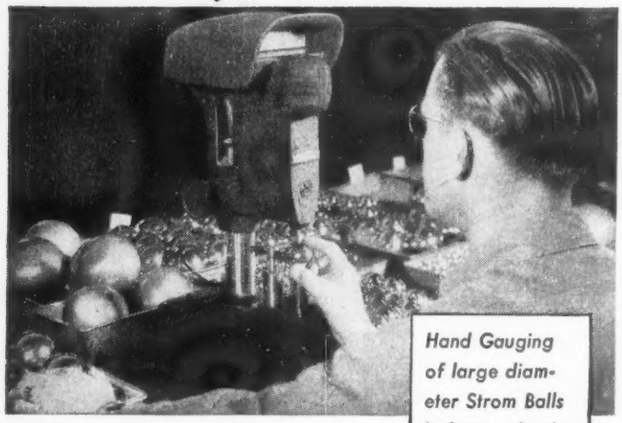

Hand Gauging of large diameter Strom Balls before packaging

When you specify Strom Balls you are sure of getting balls with the highest obtainable degree of finish, sphericity, precision—balls that give the very highest quality of service in any bearing equipment. This high degree of perfection is the result of Strom's concentration for a quarter of a century on metal balls exclusively and the perfection of the processes and workmanship necessary to produce them. Strom Steel Ball Company, 1850 South 54th Avenue, Cicero 50, Illinois.

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Layne Vertical Turbine pumps are available in sizes to produce from 40 to 16,000 gallons of water per minute. High efficiency saves hundreds of dollars on power cost per year

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LAYNE

WELL WATER SYSTEMS
VERTICAL TURBINE PUMPS

house 152 x 333 x 760 feet, estimated to cost about $650,000.

INDIANA

TERRE HAUTE, IND.—Great Lakes Steel Corp., Stran-Steel Division, Eleventh and Crawford Sts., has let contract to the Austin Co., 16112 Euclid Ave., Cleveland, for a one-story 200 x 360-foot plant addition, to cost about $500,000.

MASSACHUSETTS

EVERETT, MASS.—Boston Consolidated Gas Co., 100 Arlington St., Boston, will build a gas manufacturing plant and pumping station, to cost about $120,000.

MICHIGAN

DEARBORN, MICH.—Cube Engineering Co., 5300 Oakman Blvd., has been incorporated with $50,000 capital to manufacture tools, gages, jigs and dies, by John Palen, same address.

DETROIT—International Tool & Die Corp., 5401 Wabash Ave., has been incorporated with $75,000 capital to manufacture tools, dies, jigs and metal products, by Olaf C. Kroneman, 5959 West Warren Ave.

DETROIT—Drymar Die Corp., 2762 West Jefferson Ave., has been incorporated with $25,000 capital to manufacture tools, dies and fixtures, by Myer Dryden, 27738 Lathrup St., Birmingham, Mich.

DETROIT—Lyndon Fabricators Inc., 8740 Lyndon Ave., has been incorporated with $50,000 capital to manufacture tools, dies and sheet metal fabrications, by Arthur Rahn, 14606 Indiana Ave.

DETROIT—Goral Tool Co., 5020 East McNichols Rd., has been incorporated with $16,200 capital to manufacture cutting tools, gages, jigs and fixtures, by John Kaumeyer Sr., 23088 Batelle St., Hazel Park, Mich.

DETROIT—Kushner Engineering Co., 22513 Telegraph Rd., has been incorporated with $50,000 capital to manufacture tools, dies, jigs and fixtures, by Morris Kushner, same address.

DETROIT—Wilton Tool Co., 18075 Biltmore Ave., has been incorporated with $25,000 capital to manufacture tools and equipment, by Orville Swartz, 711 Mary St., Flint, Mich.

DETROIT—Rafel Mfg. Co., 6557 Greenfield Rd., has been incorporated with $50,000 capital to manufacture parts, tools, jigs and machinery, by John J. Hausmann, 6416 West Outer Dr.

DETROIT—Conklin Forging Co. Inc., 12660 Woodward Ave., has been incorporated with $100,000 capital to manufacture drop forge tools and forgings, by Gust Dahlen, 1068 Devonshire Rd., Grosse Pointe, Mich.

JACKSON, MICH.—Crawford Mfg. Co., 1001 Bridge St., has been incorporated with $50,000 capital to manufacture screw machine parts, by Robert Crawford, 400 Second St.

JACKSON, MICH.—Park Tool & Die Co., 231 West South St., has been incorporated with $25,000 capital to manufacture tools, dies and fixtures, by Thedore C. Urban, same address.

KALAMAZOO, MICH.—Buck Tool Co., 2009 East Michigan Ave., has been incorporated with $100,000 capital to manufacture tools and machinery, by Russell E. Buck, same address.

MIDLAND, MICH.—W & W Tool & Die Inc., 421 Saginaw Rd., has been incorporated with $50,000 capital to manufacture tools, dies and machine tools, by Irven F. Williams, 1017 West Collins Ave.

MUSKEGON HEIGHTS, MICH.—Aero Mfg. & Machining Co. Inc., 1225 Ninth Ave., has been incorporated with $11,000 capital to manufacture machine parts, tools and dies, by Vernon A. Johnson, 1720 Fifth St.

SAGINAW, MICH.—Weadock Tool Co., 111 North Weadock Ave., has been incorporated with $100,000 capital to manufacture tools, dies and jigs, by Perry L. Byard, 12260 Ward Ave., Detroit.

STURGIS, MICH.—Dan Dee Inc., Florence and South Jefferson Sts., has been incorporated with $25,000 capital to manufacture tools, equipment and machinery, by Dorothy R. Purdy, 108½ South Maple Dr.

MINNESOTA

HOPKINS, MINN.—Minneapolis-Moline Power Implement Co. plans a three-story plant addition 233 x 354 feet, to cost about $250,000.

MINNEAPOLIS—Western Electric Co., 900 Laurel Ave., has let contract to C. F. Haglin & Sons Inc., 720 National Bldg., for a three-story plant building, to cost about $600,000.

MISSISSIPPI

JACKSON, MISS.—United Gas Corp. and United Gas Pipeline Co., Deposit Guaranty Bank Bldg., plans 86-mile natural gas pipe line, to cost about $1,200,000.

OHIO

ASHTABULA, O.—Reliance Electric & Engineering Co., 1088 Ivanhoe Rd., Cleveland, plans a manufacturing plant to cost about $750,000. A. E. Rowe, 1900 Euclid Ave., Cleveland, is engineer.

BARBERTON, O.—Ohio Brass Co., Ninth and Park Sts., plans a boilerhouse 70 x 160 feet, estimated to cost $150,000, when CPA approval is obtained. William Marr is construction superintendent.

CLEVELAND—Nu-Era Window Co. will be incorporated soon by George R. Gall, 13720 Shaker Blvd., to manufacture a new type aluminum frame window. A plant 90 x 180 feet is being built on Aurora Rd., Bedford, O.

CLEVELAND—Circo Products Co., manufacturer of metal cleaning equipment, plans a plant and office costing $90,000, on Berea Rd. M. R. Black, 2835 Chester Ave., is in charge.

CLEVELAND—Eastern Mfg. Co., 12412 Triskett Rd., plans a machine shop 42 x 89 feet when materials are available. T. G. Zupan is in charge.

TOLEDO, O.—Standard Oil Co. of Ohio, 3083 Broadway, Cleveland, has let contract to Curro Construction Co., Union Commerce Bldg., Cleveland, for an oil separation and skimming plant 130 x 150 feet and three pump houses, etc., to cost about $600,000, with equipment.

PENNSYLVANIA

BRIDGEVILLE, PA.—American Cyanamid & Chemical Corp., 30 Rockefeller Plaza, New York, has let contract to Martin & Nettrour Contracting Co., Pitt National Bank Bldg., Pittsburgh, for plant addition and storage tanks, estimated to cost about $2 million.

ERIE, PA.—Perry Furnace Co., foot of Wayne St., will enlarge boilerhouse at cost of $11,500.

WASHINGTON

CLE ELUM, WASH.—John J. Wargo, city clerk, has asked bids for May 13 for 3800 feet of 12-inch water pipe, in various types.

EAST SOUND, WASH.—Orcas Power & Light Co. has called bids for May 20 for a 75-mile distribution line on San Juan island, financed by a REA loan of $196,000.

SEATTLE—Seattle Auto Freight Depot is building a reinforced concrete plant 60 x 360 feet at 2100 Alaskan Way.

WEST VIRGINIA

WHEELING, W. VA.—J. L. Stiffel & Sons Inc., Fourth and Main Sts., plans a power plant and factory to cost about $450,000. C. T. Main Inc., Boston, is engineer.

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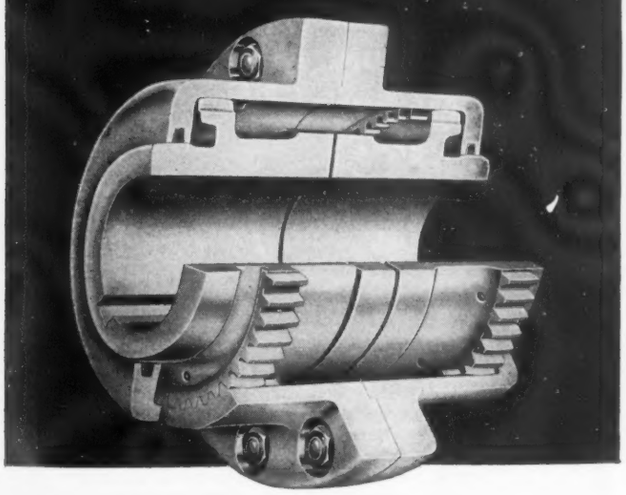

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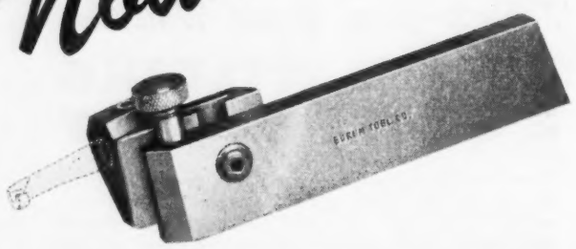

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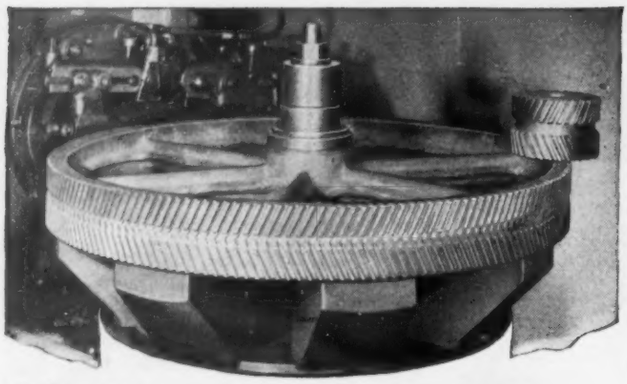

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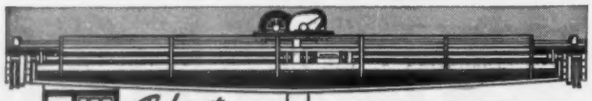

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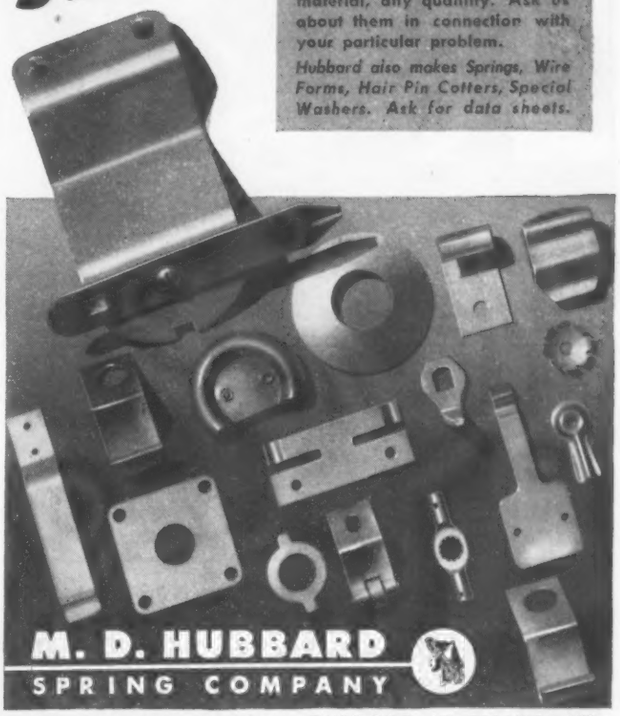

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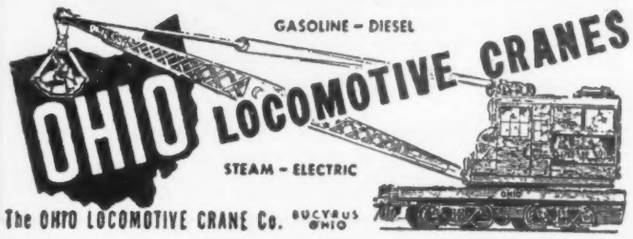

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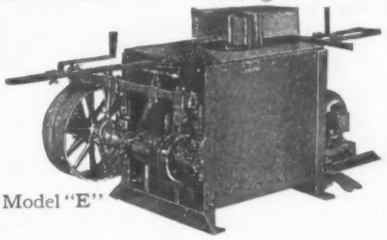

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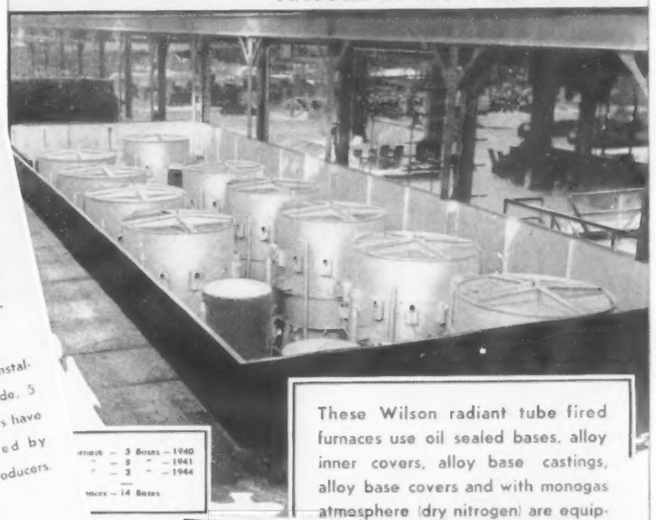

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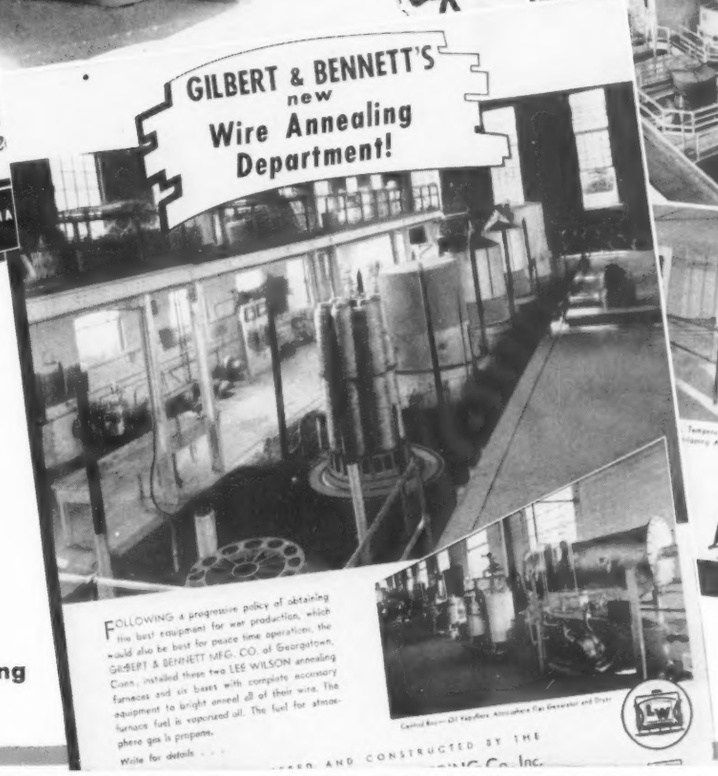

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